AVIATION WEEK

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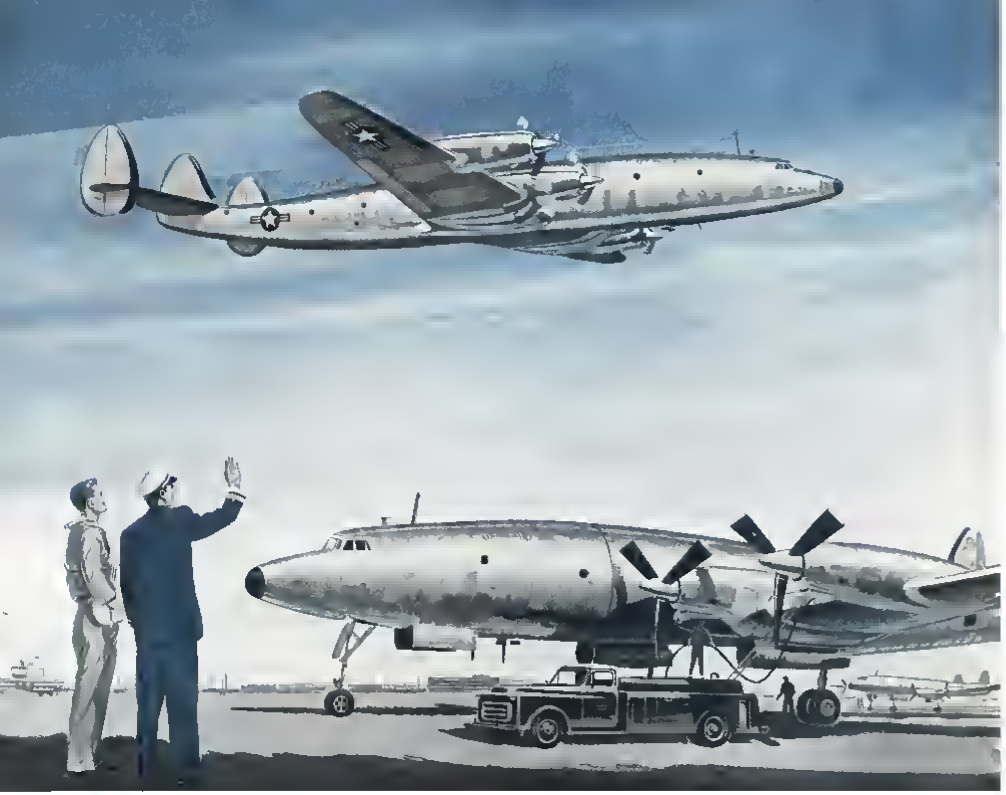

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NEWS DIGEST

Domestic

The world's first supersonic speed record was set last week by Col Horace A. Hanes in a North American Aviation F-100 Super Sabre. The new mark was recorded at approximately 825 mph. The exact figure is being calibrated and will be announced at the National Air Show at Philadelphia, Sept. 3-5 (see page 21). Col. Hanes made his supersonic runs at 35,000 ft. in a series of attempts that were plagued at the start by malfunctioning timing equipment.

First production B-58s are beginning to take shape at Convair's Fort Worth plant. Individual sections of the supersonic USAF bomber are being completed and some of the necessary tooling is ready. Production crews are finishing an all-metal simulated B-58 fuselage that will be used to determine the best methods of assembly.

North American Aviation signed a 10-year mutual assistance agreement with Rolls-Royce Ltd. that gives the British engine builder permission to manufacture rocket propulsion systems designed and developed by NAA. The pact also calls for an exchange of technical information on engineering, development and production. U.S. and British government approved the agreements saying it supports the Wilson-Sandys collaboration pact on guided missiles signed by the two countries last year.

Nearly 2,000 V1650 engines and spare parts built by Packard Motor Co. under license from Rolls-Royce Ltd. during World War II will be sold as surplus by USAF's Air Materiel Command at Olmsted AFB, Middletown, Pa. Bids will be opened Sept. 13. The aircraft engines originally cost a total of $35 million. The spares were valued at $15 million.

Seaboard & Western Airlines completed a 120-day airlift of supplies to Northern Canada for construction of the Dew Line radar warning network. Operating under a subcontract from Boreal Airways of Montreal, S&W flew a fleet of DC-4s that included two eight-ton tankers converted from dry-cargo configuration.

Ryan Aeronautical Co. has been awarded a $2.5 million USAF contract for advanced development of avionic guidance systems for supersonic missiles.

First $50,000 firm deposit for the four-place, twin-jet MS 760 business plane has been placed with Beech Aircraft Corp. by one of its distributors, J. D. Reed Co., Inc., Houston. Beech Aircraft says a number of corporations are interested in the French-designed jet. Now on a nationwide tour (AW June 27, p. 44), the MS 760 has made more than 400 demonstration flights in the past few months.

Wright Aeronautical Corp. received orders for 500 Turbo Compound engines from Douglas Aircraft Co. and 10 international airlines to power 100 DC-7Cs scheduled for delivery beginning next spring.

Civil aircraft equipment financing will be handled by a new company headed by Harold R. Harris, former president of Northwest Orient Airlines. Aviation Financial Services, Inc., New York, will serve the airline and corporate aircraft fields, using the equipment as primary collateral. Purchase and lease-back arrangements also will be used.

Gen. Bryant L. Boatner, 48, will retire from the Air Force at the end of August because of physical disability. His last assignment was Deputy Chief of Staff for Materiel. Boatner was awarded the Distinguished Service Medal for outstanding accomplishments in that post.

Air Carrier Service Corp. sold seven transports for a total of $3.7 million to three foreign airlines. Indian Airlines Corp. purchased three DC-4s, Real Transportes of Brazil bought two Convair 340s and Nippon of Japan took two DC-3s.

Britain Orders Plane With Inflated Wings

Wings inflated by compressed air are features of this new 550-lb. utility two-seater, a number of which have been ordered by Britain's Ministry of Supply. Powered by a 65-hp. pusher engine, the unusual plane is stated to have a 100-mi. range. Wings span 40 ft. and can be detached for storage. Plane was designed by J. O. Lobelle, former designer for Fairey Aviation Co., Ltd., and was built by M. L. Aviation Co.

Financial

British European Airways reported a net profit of $176,509 for the fiscal year ended March 31, compared with a loss of $4,966,631 during the previous 12-month period. Operating revenues increased 16% to $47,995,679. Expenses were held to $47,819,170, only 3.2% above last year. Break-even load factor was reduced to 66.6% from 74.4% in Fiscal 1954-55.

Solar Aircraft Co.'s backlog of unfilled orders totaled $50 million this month, increasing from $36,620,100 during July. Net profit for the first quarter of the current fiscal year was $380,600, compared with $424,800 for the three-month period ended July 31, 1954. Sales dropped to $12,947,600 from $15,750,500.

International

English Electric Canberra streaked from London to New York and back in 14 hr. 20 min. Aug. 23, including a 35-min. turnaround at Floyd Bennett Field. On the 3,457-mile westbound leg, the British jet bomber averaged 481.52 mph. against 40-mph. headwinds and completed the flight in 7 hr. 29 min. Pushed by tail winds on the return flight, the Canberra crossed the Atlantic in 6 hr. 16 min. at an average speed of 550.35 mph.

WHO'S WHERE

In the Front Office

V. N. Sucu, president of Monument Engineering Co. Other new officers of the Indianapolis firm **R. L. Suk**, vice president and treasurer, **H. Happel**, chief engineer, **W. Jakelsky**, sales director, **J. Williams**, factory superintendent, and **G. Hopkins**, production control.

Anthony J. Mug, vice president of Trade Ayer Co., Linden, N. J.

L. H. McCaughey, vice president of Templet Industries Inc., Brooklyn, N. Y.

Armand J. Thieblot, a director of Vitro Corporation of America. He is president of Thieblot Aircraft Co.

James E. Lockart, Jr., vice president, SAC Service Division of Southwest Armature, Dallas. Also promoted: **Paul A. Kennedy**, vice president, Distributor Sales Division; **Al Harting**, vice president, public relations and advertising; **John Bricker**, treasurer; **Lorraine Sanders**, secretary.

Honors and Elections

Arthur C. Storz, Omaha businessman and longtime proponent of air power, elected "Man of the Year" by the Air Force Assn.

Changes

H. O. Houchen, deputy operations director for British Overseas Airways Corp. Other changes: **J. R. Stanton**, general manager of stations and traffic; **Gilbert Lee**, general sales manager; **Charles Abell**, chief engineer, and **Capt. J. C. Harrington**, deputy director of flight operations.

Harry Stola, assistant general manager of Bendix Aviation Corp.'s Marshall Eclipse Division.

Alois Berny Essex, administrative engineer of Ford Instrument Co., division of Sperry Rand Corp.

Allen E. Smith, chief engineer of Socony Mobil Oil Co.'s aviation department.

Edward R. Toporeck, director of the field test and instrumentation staff for Ramo Wooldridge Corp.'s Guided Missile Research Division. Other new directors in the division: **Dr. Edward B. Doll**, project control staff; **Allen F. Donovan**, aeromechanics and propulsion staff.

William L. Carolla, Chicago manager for An Associates, Inc.

I. P. Grunwald, assistant to the controller of Lockheed Aircraft Corp.

Capt. George I. Myers, retired from United Air Lines after 28 years with UAL's Flight Operations Division.

William A. Barnett, Los Angeles regional sales manager for Airwork Atlantic Ltd.

John T. Robinson, sales manager of Greer Hydraulics' Products Division.

Wells H. McLean, Miami traffic representative for Aviensa Airlines.

W. D. Rothell, West Coast district manager, Stratoflex, Inc.

Ray E. Peterson, Honolulu district passenger service manager, United Air Lines.

Ralph Platt, managing editor of Pegasus, monthly publication of Fairchild Engine & Airplane Corp.

INDUSTRY OBSERVER

► Navy's Sidewinder air-to-air missile, developed by scientific teams at the Naval Ordnance Test Station at Inyokern, Calif., is expected to cost less than $1,000 per round in production. Estimated cost is about one-tenth that of comparable Navy Sparrow and USAF Falcon.

► **Capsule ejection system is being considered for Northrop's long range interceptor design.**

► Latest fast submarines, particularly those intended to be powered by nuclear reactors, are running into the same stability and control problems currently plaguing aerodynamicists. Cross-coupling between roll and yaw in sharp turns has necessitated "tail surface" modifications.

► **Bell Aircraft has developed a helicopter flight simulator which will give equivalent of four hours of primary flight instruction. The model 2-FH-2 will be installed at Navy Flight School, Pensacola, Fla. It was developed under contract with Office of Naval Research's Special Devices Center. Pilot's compartment is replica of Bell 47 cockpit, with dual controls and standard instrument panel.**

► Northrop Aircraft is scheduling its 50-ton Sheridan stretch-forming machine almost full time on sheet work for the North American Aviation F-100. The machine can handle 14 x 20-ft. sheet.

► **Falcon firing tests to check the dynamics of separation from the Convair F-102 have been made on half-scale model of the plane on the snort track at Inyokern Naval Ordnance Test Station.**

► Doman Helicopters, Inc., Danbury, Conn., believes it has an edge over other entries in Royal Canadian Navy's new anti-submarine helicopter competition because it is the only firm with copter manufacturing facilities in Canada—Doman-Fleet Helicopters, Ltd., Ont. Doman's proposal uses three General Electric T58 turbines and has folding tail and rotor blades for carrier stowage. A number of U.S. manufacturers have submitted designs to RCN, most of which are modifications of existing types.

► **Look for increased Army interest in the use of helicopters as fuel tankers to supply combat vehicles in the field. USAF is expected to begin "dry run" trials of several existing copter models at Edwards AFB soon. Under the fuel tanker helicopter concept, the craft would refuel vehicles and light Army aircraft while hovering overhead, and other helicopters in mid-air.**

► Rocket boost takeoff units used with Northrop SM-62 Snark impose 55G load on missile and affect reliability of avionic guidance components. Rather than redesign equipment mountings, company may use slower-burning rockets which will impose fewer G's.

► **Bell Aircraft's Texas Division has a human engineering contract for development of ideal all-weather helicopter flight instruments. Joint sponsors of the Ideal Man-Helicopter Engineering Project are Office of Naval Research, Bureau of Aeronautics, Army Transportation Corps. First step of the IMHEP contract calls for industry-wide survey of all prospective subcontractors to determine individual capabilities and their possible degree of participation in program. The Bell project closely parallels Navy's fixed-wing instrument development study which has been conducted by Douglas.**

► USAF's Aviation Engineer Force, Wolters AFB, Tex., is launching a new project to reclaim air bases after they have been hit by atomic bombs. New decontamination procedures and reconstruction methods will be perfected by the USAF unit to speed rehabilitation of airfields after an atomic bomb attack.

► **Fiber metallurgy, a new technique developed by Armour Research Foundation, may lead to an entirely new use of metals that promises better filters and rapid cooling of jet engine components. Other applications, based on stiffness-to-mass ratio of fiber bodies, may be in aeronautical skeletons to support plastics, ceramics or friction materials.**

AVIATION CALENDAR

Sept. 3-5—Twenty-ninth National Aircraft Show, Philadelphia International Airport.

Sept. 6-11—Society of British Aircraft Constructors Aircraft Show and Flying Display, Farnborough, England

Sept. 7-10—American Society of Photogrammetry, semi-annual Convention and Trade Show, Statler Hotel, Los Angeles

Sept. 8—Airwork Pratt & Whitney Aircraft Forum, Millville, N. J. Second forum will be held Sept. 16 in Miami

Sept. 12-15—American Meteorological Society's 139th National Meeting and Fifth Weather Radar Conference of Army Signal Corps, Fort Monmouth, N. J.

Sept. 12-16—Instrument Society of America, Instrument Automation Conference and Exhibit, Shrine Exposition Hall and Auditorium, Los Angeles

Sept. 17—Institute of Radio Engineers, Symposium on Automation, Cedar Rapids

Sept. 17-18—Antique Airplane Assn. Convention and Fly-In, Ottumwa, Iowa

Sept. 19-21—American Rocket Society, Western Fall Meeting, Los Angeles

Sept. 21—Southwest Automotive Engine Forum, sponsored by Pratt & Whitney and Bendix, Melrose Hotel, Dallas

Sept. 21-22—American Helicopter Society, second West Coast Forum, Hollywood Roosevelt Hotel, Hollywood, Calif.

Sept. 28-29—American Institute of Electrical Engineers and Institute of Radio Engineers, Park Sheraton Hotel, Detroit

Sept. 29-30—Radio Technical Commission for Aeronautics, fall assembly, Hotel Statler, Washington, D. C.

Oct. 3-5—Eleventh National Electronics Conference, Hotel Sherman, Chicago

Oct. 4-6—Eleventh annual Aircraft Spark Plug and Ignition Conference, sponsored by Champion Spark Plug Co., Secor Hotel, Toledo, Ohio

Oct. 5-7—National Business Aircraft Assn., eighth annual Meeting and Forum, Sheraton-Cadillac Hotel, Detroit

Oct. 5-7—1955 National Airports Conference, sponsored by American Association of Airport Executives and University of Oklahoma, Norman, Okla.

Oct. 5-9—World Plastics Fair and Exposition, National Guard Armory, Los Angeles

Oct. 7—Escape from High Performance Aircraft Symposium, sponsored by Institute of Transportation & Traffic Engineering, Ext. at U.C.L.A., Aeromedical Engineering Assn., Institute of the Aeronautical Sciences, IAS Building, Los Angeles

Oct. 11-13—Society of Automotive Engineers, Golden Anniversary Aeronautic Meeting, Aircraft Production Forum and Aircraft Engineering Display, Hotel Statler, Los Angeles

Oct. 17-21—National Safety Council, 43rd National Congress and Exposition, La Salle and Conrad Hilton hotels, Chicago

Oct. 17-21—International Air Transport Assn., 11th annual general meeting, Waldorf-Astoria Hotel, New York

Oct. 20-21—Sixth annual National Noise Abatement Symposium, Armour Research Foundation, Chicago

PICTURE CREDITS

17—San Diego Tribune-San Diego Union; 33—(Top) Howard Levy, (Bottom) Wide World

Washington Roundup

Quarles Differs

USAF's new Secretary Donald A. Quarles lifted a few Air Force eyebrows in the Pentagon with statements he made on a radio broadcast about 10 days after replacing Harold E. Talbott. Replying to questions by John Randolph Hearst, Quarles made these statements:

- "I have no evidence that the Soviets can make a truly effective changeover to new equipment more rapidly than we."
- "Our present Air Force goal of 137 wings is a sound goal."
- "American youth is . . . just as much attracted to a jet career (as ever)."

Air staff opinion, already expressed by top generals and recruiting experience, widely publicized by USAF and its ROTC chiefs, indicate a differing viewpoint in each case. Initial reaction is expected to retard Quarles in his approach to the press. His reputation for conservative approach to publicity was one reason for the appointment.

India Bilateral

Civil Aeronautics Board is seeking an early start in renewing negotiations with India for a bilateral air transport agreement. A U. S. delegation which will probably be headed by CAB Chairman Ross Rizley, is hopeful of leaving for India by late September. Because neither CAB nor the State Department have any fresh ideas on how to approach the Indians, U. S. flag-carriers have been invited to meet with CAB Sept. 8 for a preliminary discussion of what steps might be taken.

Advance consultation with the interested U. S. air carriers is expected to avoid the difficulties that developed when the U. S.-West German bilateral was announced. Additional problems are present in dealing with the Indians, however, since India denounced the previous air bilateral last January and has since given no indication of a desire for a renewal. Currently, the two U. S. airlines flying through India—Trans World Airlines and Pan American World Airways—are operating under a one-year unilateral grant which permits each carrier one stop with two flights weekly until Jan. 14, 1956.

Flying High

Prospects are that more than one legislative proposal will be introduced at the next session of Congress to ban the service of alcoholic beverages aboard commercial airliners. However, observers predict that it will be a situation that will develop more headlines than concrete action. There is a comparison here between the objections to liquor in flight and the continuing fight to grant "ministers of religion" free air transportation—congressmen are reluctant to vote against either proposition but neither can ever get out of committee.

Latest legislator opposing in-flight drinking is Rep. Thomas J. Lane (D-Mass.) who said he will introduce a bill next January that would make it a federal crime to serve liquor on flights. Lane says he feels that the serving of drinks to airline passengers is a "dangerous custom . . . a potential nuisance to passengers and crews and is a threat to safety of all."

Not all of the scheduled airlines serve drinks as a passenger service. Capital Airlines, for example, does not and has strenuously appealed to the Civil Aeronautics Board for relief of "unfair competition" it allegedly has suffered. The Air Lines Pilot Assn. has passed a resolution opposing passenger drinking on flights, and a similar position is endorsed by the Airline Stewards and Stewardesses Assn.

West Coast Dispersal

West Coast has renewed its fight against the Air Force policy barring expansion of the aircraft facilities located there.

Sen. Thomas H. Kuchel (R.-Calif.) also is pushing the case at the White House. He has discussed the problem with Howard Pyle, a White House aide, who recently met with Los Angeles representatives.

"The question of dispersal is being carefully weighed by the White House staff and the Pentagon," Kuchel said. "I have been assured that there will be no discrimination in defense procurement against our state."

"A new Air Force Secretary has just taken office and is familiarizing himself with a multitude of problems."

Kuchel said there have been representations from California that the Air Force policy has caused much uneasiness and confusion among workers, management, civic officials and community leaders.

Broad-Base Pays Off

Recent flood havoc wrought on industrial installations in Northeastern U. S. pointed up efficacy of USAF broad-base production program. Damage, which in some cases was akin to towns being knocked out by enemy action, was not seriously affecting the output of major aviation firms in New York area, an AVIATION WEEK survey showed. Although Wright Aeronautical, Grumman and Republic reported that they were having difficulty establishing communication with suppliers in hard-hit towns, the companies felt that in most cases they could continue normal operations by asking second sources in unaffected areas to step up production of needed items until sources damaged by flood could get back into production.

Procurement Changes

While Defense Department ostensibly is studying Hoover Commission recommendations, changes quietly are being brought about that would correct some of the flaws found in current procurement practices. A Military Production Urgencies System has been created, spelling out pre-M-day and post-M-day guidance to prevent conflicts when the three services are competing for industrial output. T. P. Pike, Assistant Secretary for Supply and Logistics, has started to circulate memoranda to stimulate mobilization planning under the Production Allocation Program.

The Hoover Commission Task Force on Military Procurement was strongly critical of the Defense Department on both of these points. It found that Pike's office has been hampered by the fact that it "is not an effective participant in the logistical evaluation of military plans and is too far removed from their formulation to be so." At another point, it said that in the absence of a unified set of material requirements, "The Production Allocation Program has not been working efficiently and in some areas has been misleading."

—Washington staff

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Airlines Seek Rapid Write-Off Extension

Industry fears suspension by ODM of quick tax benefits will inhibit transport aircraft purchases.

Washington, D. C.—Suspension of fast tax write-off benefits for airlines by the Office of Defense Mobilization is causing concern in the industry over future transport purchases.

Commercial transports were among a number of defense items caught in ODM's freeze of its rapid amortization program. Airlines have relied heavily on the tax benefit in its recent rounds of fleet modernization.

With the cost of commercial transports doubling within five-year periods, industry officials are expressing fears that lack of rapid amortization help will inhibit future purchases, especially in the expensive jet airliner field.

ODM is currently reviewing commercial aircraft along with 37 other suspended items for possible renewal or cancellation. A decision is expected within a few weeks, and the airline industry and Defense Air Transportation Administration are pressing for an extension of the commercial authority.

600-Aircraft Goal

Rapid tax amortization has been used by airlines in the past five years as an aid in the purchase of most of their modern equipment. Offered as an incentive for modernization of the commercial air fleet when the Korean war began, the program has been continued since then by ODM as a means of encouraging the airlines to keep their equipment up to date in the interest of national defense.

Under the plan, an airline can apply for a certificate of necessity which authorizes a fast tax writeoff on an aircraft purchase. The application is reviewed by the Defense Air Transportation Administration and a recommendation is made to ODM.

If ODM approves the certificate, the airline is allowed for tax purposes, to depreciate 80% of the value of the aircraft in five years. This method defers tax payments and allows the airlines to build reserves faster to meet new purchase requirements.

Originally ODM set a goal of 600 aircraft for the program. This goal was reached last November.

Review Under Way

Early this month, ODM suspended 38 goals, including commercial aircraft, and closed 19 others, leaving 20 of the original 225 goals still open. The suspended goals are being reviewed by the Defense Mobilization Board to determine whether adequate capacity exists or whether they should be extended to fulfill the program.

A major influence behind the ODM move is Secretary of the Treasury George M. Humphrey, who doesn't like to lose the tax receipts deferred by rapid amortization, and who feels that the plan is an artificial type of stimulation. Critics of fast write-offs for airlines say that the carriers are prosperous and don't need the incentive, that they will buy the airplanes anyway.

Proponents of a continued program base their argument on national interest—the cheapest way of keeping the nation's air transport capacity up to date. DATA has recommended that commercial aircraft be assigned an open-end goal which would set no numerical limit to the program. As an alternate, the agency has asked for a 300 aircraft extension. Current applications pending would take up more than two thirds of such an extension.

DATA bases its recommendation on the continuing need for a large, modern commercial air fleet. The agency feels that the program is of greater benefit to the national defense than it is to the airlines. DATA also is concerned with the Civil Reserve Air Fleet which must be kept abreast of technical development and which will probably have to be expanded in the future.

ATA Arguments

Support for the position of DATA is found in the Civil Air Policy submitted to the President in May 1954, by the Air Coordinating Committee. In one of its recommendations, the policy report says that for long range planning purposes there is an open-end requirement for expansion of transport air power limited only by what the taxpayer can afford for military transport capability and by sound promotional policies for civil transport.

Air Transport Assn. also supports expansion of the mobilization goals. ATA argues that promotion of a fleet of long range transports through a tax amortization program is one of the best bargains the government ever found. The association points out that the aircraft are purchased and maintained with private funds for both military and civilian use in an emergency.

ATA feels the airlines should be encouraged to buy as many aircraft as they can economically support. It is also pointed out that, unlike other items, airplanes must be depreciated and replaced quickly.

Rapid amortization is an aid to airlines in their borrowing for new purchases. Another factor involved is that when a replacement for the DC-3 is established, the local airlines are going into a large-scale replacement program and will need rapid amortization aid.

Further support for the national interest arguments is found in the report of a Civil Aeronautics Board Industry Advisory Committee on Mobilization.

In its report, the committee says that the civil fleet, less the 317 plane Civil Reserve Air Fleet, would fall short of minimum war-time civil traffic requirements by 58 aircraft of the DC-7, DC-6A and L 1049C type.

Since the 600 aircraft mobilization goal was reached last November, applications for 266 aircraft have been received by the ODM. Until an extension is granted, these applications can't be considered. Presumably they were filed in order to be first in line if an extension should be granted.

Tax Write-Off Applications

Airline	Number of Aircraft	Amount (In millions)
American Airlines	66	$117
Braniff Airways	9	19
Capital Airlines	60	64
Delta Air Lines	11	25
Eastern Air Lines	38	110
National Airlines	4	2.5
Northwest Airlines	21	49
United Air Lines	43	72
Western Air Lines	12	15

XV-3 Makes First Vertical Flight

Bell Aircraft's XV-3 convertiplane has made its first flight, hovering and maneuvering 20 feet above the ground, at the company's plant in Ft. Worth, Tex. Floyd Carlson, Bell's chief helicopter pilot, was at the controls.

Conversion to horizontal flight will be made later in the test program.

The Bell machine has rotor-propellers at the end of its 30 foot wings which rotate horizontally for vertical flight and can swing forward 90 degrees for long distance flights.

Developed by Bell and USAF's Air Research and Development Command, the convertiplane is an Army project, designed to increase the mobility of infantry soldiers in battle areas.

Avionics' Manufacturers to Form Backbone of Automation Industry

By Philip Klass

San Francisco—Avionics' manufacturers will form the backbone of the fast growing automation industry which is destined to become one of the nation's largest single industrial businesses with annual sales in the billions of dollars.

The above prediction was made by Dr. Dean Wooldridge, president of Ramo-Wooldridge Corp., in a speech before the Symposium on Electronics and Automatic Production attended here last week by more than 500 officials from almost as many companies and sponsored by the Stanford Research Institute and the National Industrial Conference Board.

The broad technical competence required to develop and produce modern military weapon systems such as fire control and missiles, bears a striking similarity to what is needed to do an effective job in automating manufacturing and business operations, Wooldridge said.

The avionics executive told the symposium that, as a result of military weapons system work, avionics firms have the required competence in electronics, operational analysis, systems engineering and human engineering for the designing of highly-complex equipment for use by semi-skilled personnel.

"Many of the specific techniques and devices being used today in automation were developed in military electronics projects," Wooldridge pointed out in reference to such things as servo systems, computers and automatic data handling systems. He added that, 'to a considerable extent, the equipment and methods of modern automation are today being developed by individuals who cut their teeth in military electronics work."

Two Approaches

Because of similarity, Wooldridge urged industry to profit from military experience and adopt the systems approach which is now being used in the development of new and complex weapons systems. The executive cited the unhappy experience of the military services during and shortly after World War II in buying individual "black boxes" and attempting to wed them to an integrated, smoothly-functioning fire control or bombing system as a warning to industry against trying to piece together its own complex automation systems.

What is needed, Wooldridge said, is a competent automation systems team, consisting of experts in business, industrial procedure, electronics, servo mechanisms and data handling equipment. Such a team could study the problem and come up with the best automation solution—or perhaps the answer that automation is not beneficial.

Certain large companies may find it economical to establish their own automation system teams. Smaller firms, however, will find it pays to employ the services of an outside organization with systems competence in the automation field, Wooldridge believes.

What American industry gets in return for the billions of dollars it will invest in automation equipment during the coming years will depend upon whether it uses the systems approach, Wooldridge said.

Competitive Advantage

'A forward looking automation program can enable a company—almost overnight—to cause an upheaval in its competitive field despite the fact that all its competitors are employing heavy sales artillery,' Paul B. Wishart, president of Minneapolis Honeywell warned the symposium.

Wishart also supported Wooldridge's position, declaring that 'The handling of this (automation) problem cannot be effectively delegated within an organization on the supposition that it is chiefly a matter of technology."

"While many of the larger companies already have large and competent staffs of technicians studying, devising and recommending automation programs, the smaller companies cannot afford the

USAF Warns Industry To Improve Avionics

Avionic manufacturers have been warned that if they do not improve electronic reliability the airframe industry will be forced to design and produce components for U. S. Air Force weapons systems.

Speaking at a Philadelphia conference called by U. S. Air Force and Radio Corp. of America, Maj. Gen. Thomas P. Gerrity, Assistant for Production Planning, Deputy Chief of Staff, Materiel, called for "an advanced technology of reliability." He added:

"The equipment manufacturer must take the lead in this effort, not the Air Force. The equipment manufacturer must prepare the specifications. In the final analysis, the Air Force can only review these specifications, advise, and offer constructive criticism based on past experience."

Gen. Gerrity said it is time for the industry to "get away from the radio and television type of component" because standards of reliability used in their design and manufacture do not suffice for modern weapons systems.

He said there are studies showing that the reliability of an aircraft on a mission comes from the degree of component reliability and the number of components in the equipment. Failure rates must be less than one in 20,000 to get 80% reliability out of a weapons system with 4,000 components.

For the future, Gen. Gerrity sees need for electronic aids that will be reliable at speeds of Mach 3 and above. New techniques of development are necessary to meet this challenge, he said, because design aims will be defeated if equipment for use at these speeds is produced with present standards of reliability.

USAF Saucer Project

In a terse announcement that it has a contract involving a new aircraft design concept with the Avro Aircraft Ltd., U. S. Air Force last week gave cautious confirmation to reports that it has taken over the Canadian flying saucer project.

Despite tight security wraps on the Avro plant at Malton, Ont., where the project prototype is located, it was reported that Lt. Gen. Donald L. Putt, USAF Deputy Chief of Staff for Development, has visited the site.

Air Research and Development Command took over the development after the Canadian government had spent only $397,000 on the design. This followed an estimate by Canadian Defense Production Minister C. D. Howe that construction of a prototype will cost $100 million.

THESE SUPERSONIC F-102As, first of their class to join the Air Force, are shown (above and below) in their initial formation flights over Southern California. USAF has announced three production orders for the Convair delta-wing, all weather interceptors.

luxury of such departments."

Wishart, however said he is optimistic that automation-equipment manufacturers will develop a line of semi-standardized equipment which can meet the "common denominator requirements" of hundreds of small and medium size firms. This he said, would enable such firms to benefit from a certain amount of automation without tailoring the equipment to its specific needs.

Wishart also suggested that companies might look into reducing the cost and price of their existing products, via automation, rather than spending the money on product diversification which is popular throughout industry today.

Rear Adm. F. R. Furth told the executives that the Navy is heavily engaged in investigating the uses of automatic electronic-data processing systems to improve the efficiency of its supply system and the effectiveness of its strategic planning. Furth is chief of the Office of Naval Research.

The Admiral reported that, through the use of a logistics computer, a research tool especially designed to handle supply problems, the Navy was able to solve in two days a problem involving types and grades of personnel required for establishing an advanced base. The problem, he said, would have required two months to solve through conventional procedures. A similar problem—determining the total materiel requirements for two Marine divisions—was calculated in three hours with the logistics computer as compared with several weeks previously required.

As a result of experience gained with its logistics computer, the Navy believes it can develop electronic-data processing systems specifically tailored to its problems which can be operated at one third the cost of conventional electronic digital computers designed for general purpose use.

Adm. Furth said the use of electronic data processing machines also is expected to provide Navy inventory control and procurement centers with more speedy information on the day-to-day consumption and inventory of the thousands of military items which it must buy and stock.

Furth said that advantages which should accrue to the military services—as well as to industry and the nation as a whole—from the use of electronic-data processing systems include:

- **Speedy analysis** of the logistic implications of strategic plans and industrial capability to determine whether the nation can support such an operation. If one set of plans is beyond the nation's capability, another set can be quickly drawn and tested.
- **Smoother scheduling of production** and elimination of bottlenecks before they appear with consequent reduction of demands on transportation.
- **Reduced burden** on American industry, freeing more industrial capacity for civilian production.
- **Far fewer clerical employes** required by the military for stock and inventory control, freeing manpower to work in industry during wartime.

Convair Introduces 440 Transport

San Diego—Convair placed an improved airliner on the market last week—the Convair 440—a modified version of the present Convair 340. Its manufacturer claims it has the quietest passenger cabin of any transport in the world.

Scandinavian Airlines System was expected to place an order for eleven 440s late last week. Real Transportes S.A. of Brazil has ordered four. Other foreign orders are pending.

The company's decision to call the new airliner the 440 rather than the 340B was based upon the speed and sound improvements made over the 340s. Other specifications are the same.

Guaranteed boost in cruise speed of the 440 over the 340 is 5 mph., and it is likely that an additional speed increment may be available.

Improvements made to achieve the 5 mph. speed increase include:

- **Extended nose cowl** with smaller inlet area, improving cooling and reducing drag. Smaller inlet gives a high ram air velocity. Better nacelle fineness ratio reduces drag.
- **New baffling.** For additional improved cooling and reduced drag. Convair incorporated new engine cylinder baffles and cylinder head deflectors for the P&WA R2800 powerplant. This better performance is particularly important during climb or use of maximum continuous power.
- **Improved aerodynamic cleanliness.** The aft section of the engine nacelle has been reduced in size and more effectively blended into the adjacent wing area minimizing discontinuities in transition from nacelle to wing.

The dual augmentor tubes are eliminated, substituting in their stead a rectangular silencing muffler.

A sound improvement program (AW Mar 28, p. 87) has resulted in a considerable reduction in speech interference.

Measured on an acoustical comfort index (proposed by Douglas Aircraft El Segundo Division's Lippert and Miller in 1951) ranging from minus 50 (extremely uncomfortable sound level) to plus 100 (ideal sound level) the standard Convair 340 passenger cabin rated about 45 for row 1 and about 15 for row 11 (last row). In the Convair 440, row 1 shows up as 75 while row 11 is about 60.

The exhaust silencer is the outstanding single item in the sound modification program. Another sound muffling development includes a special assembly for all windows. This consists of a rubber-supported floating inner window which seals against the outer window to give a fixed air space. Space is balanced to internal pressure and humidity by a plastic bladder which expands and contracts according to pressure differential. First four rows of seats have glass inner panes; the remainder are plexiglas.

Acoustical tape, a sound damping material known as Permacel Tape No. 12, is applied directly to the inside of the fuselage skin in varying thicknesses and according to pattern to afford maximum benefit with minimum weight.

Sound damping tape also is applied over ventilating ducts.

Ceiling sidewalls upper and lower sides of luggage racks and ventilation duct sides facing the cabin interior are covered with an additional layer of fiberglas.

A porous trim cloth in ceiling acts as sound barrier and deadener.

Improvements result in an estimated weight empty increase of 800-1000 lb.

To boost the takeoff gross and offset the increased empty weight, an improvement in flap performance has been incorporated. This improvement is accomplished by the addition of a wing trailing edge extension over the extended flap so that there is a converging effect on the airstream between the flap and the wing trailing edge.

This gives an improved lift coefficient for the wing, permitting a guaranteed takeoff gross of 49,000 lb. at CB17 power (wet takeoff with 2500 hp., using 115/145 fuel) or 47,900 lb. at CB16 power (wet takeoff with 2400 hp., using 100/130 fuel).

Helicopter Effective Life Saver In First Full-Scale Disaster Trial

Helicopters passed their first full scale test under disaster conditions last week by operating successfully under the most adverse circumstances in the flood-stricken Northeastern U S according to an AVIATION WEEK survey of industry, civilian and military authorities.

Rushed in without advance warning, and often with a strange fuel in their tanks, helicopters prowled over water-logged stretches of New England, Pennsylvania, Northern New York and New Jersey, saving many who otherwise would have drowned and picking up still others who, but for the helicopter, would have remained cut off for days. As one Civil Defense official summed up the helicopter's role: "If we didn't have (them), the number of lives lost probably would have been in the thousands instead of in the hundreds."

The mass helicopter operations, carried on from dawn to dusk with aircraft loaned by all the military services and by manufacturers located in or near the stricken areas, demonstrated these advantages:

• **New areas.** Many rescues were made at points heretofore inaccessible. People were picked up not only from isolated land areas but from trees, roof tops and from the flood currents. The hovering ability and sling mechanism of the aircraft were particularly helpful in these operations.

• **Adaptability.** Copters were flown in torrential rains and other adverse conditions which would have made flight by plane impossible. Some, unequipped with hoist mechanism lowered ropes to effect rescues; others landed on small land formations.

• **Dependability.** Of an estimated 70 copters flying in the stricken areas only two operational failures were reported. A Marine HRS crash landed at Stafford Springs, Conn., and a Navy HUP was grounded in the Delaware River area, both with engine trouble.

The low-failure ratio was compiled even though many of the aircraft were forced to use 100 and 130 octane fuel instead of their normal 91/96 octane because of a shortage of the latter.

Duties performed included:

• Rescue work.

• Aerial photography and reconnaissance.

• Air-lifting emergency generators and other hospital equipment.

• Supplying bread, water, foodstuffs, medical supplies and water purification tablets.

• Transporting troops, rescue and survey personnel.

• Laying telephone cables.

Helicopters from nearby bases of each of the armed forces were despatched to threatened areas early on August 19 as the waters began to rise. Control centers were established at Johnsville, Pa., for the Delaware River area and at Bradley Field, Windsor Locks, Conn., for the Massachusetts-Connecticut region.

Brig. Gen. G. R. Stanley, of the Air National Guard, was in command at the Connecticut field. Some 50 military and private aircraft were in use in that area at the peak of evacuations. Commander C. H. Franklin, U.S.N., coordinated the helicopter operations at Johnsville.

Navy-operated HO4S, with single rotor, a crew of 2 and 8 passengers, and HUPs, with single engine, tandem rotor and internally operated rescue hoist, saw action in both areas. H-19s, USAF versions of the HO4S, H-21s twin rotor, 14 passenger "Workhorse" and H-25s, counterpart of the HUP, were also operated by Army, Air Force and Air National Guard units over both disaster zones.

Marine Corps HRS, single-rotor, 8-passenger vehicles, and Coast Guard HO4S-2Gs were in use in the New England area.

Industry observers were outspoken in their praise of the helicopter's accomplishments in "the largest mass rescue by air." One spokesman said: "This proves conclusively that if we had extensive helicopter operations—airlines, industrial and military—it would be invaluable in emergency situations.

"They (helicopters) can go anywhere under any conditions."

Nonsked Fights on Two Fronts

Faced with new battles on the economic front, North American Airlines has gone to the U. S. Court of Appeals in its continuing legal fight to stay in business.

The nonscheduled operator has asked the court to reverse the Civil Aeronautics Board action which would put it out of business. The carrier has also asked the court to stay effectiveness of the CAB order (AW July 11, p. 107) while it is under judicial review.

While the legal process continues, North American and other irregular operators are faced with a new competitive threat in the form of fare cuts made by the transcontinental trunk airlines. The new fares, which go into effect in mid-September on Trans World Airlines, United Air Lines and American Airlines, are virtually identical to North American's $160 round trip fare between major East Coast and West Coast cities.

North American Airlines said last week that competition with the schedules and equipment of the three trunk carriers at the same fare is virtually impossible for the irregular carriers which offer most of their service in DC-4 equipment. Most trunkline coach service is on DC-6 and Constellation equipment.

North American can continue to compete with the trunks with its DC-6B flights, according to a company spokesman. The carrier has two DC-6Bs and is in the market for more.

Aircoach Transport Assn. President H. B. Johnston credited nonscheduled airlines with promoting the fare cuts and said that "a permanent independent airline industry is essential to keep airline rates from going up."

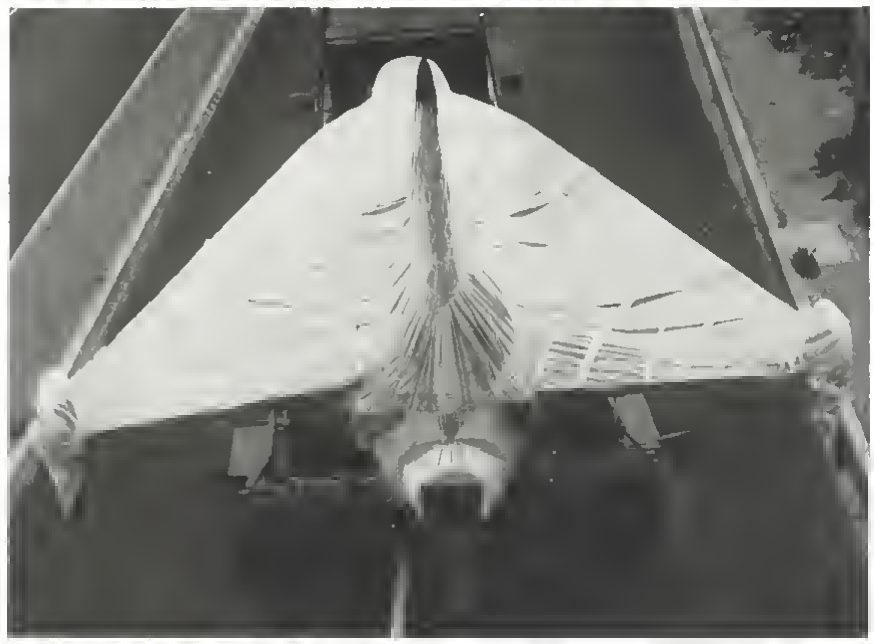
In its petition to the U. S. Court of Appeals for the District of Columbia, North American challenged the findings of CAB in its order. The carrier told the Court that the regulations applied to irregular carriers by CAB are invalid. In its brief, North American alleges that CAB adopted its regulations with the purpose of making irregular operations economically impossible, thus forcing the carriers to quit operating or be subject to enforcement action.

North American has also asked the court to stay effectiveness of order while the matter is under review. The carrier asks the stay to enable it to stay in business while the Court is reaching a decision and while CAB is considering various North American applications for a certificate.

New TWA Traffic Bid

Trans World Airlines made a second surprise move in the rapidly developing battle for transcontinental traffic by applying to the Civil Aeronautics Board for permission to operate nonstop coast-to-coast aircoach service. TWA wants to start operating a combination tourist first class nonstop service with Super-G Constellation equipment Sept. 25.

The nonstop tourist plan follows closely TWA's fare cut to $80 for transcontinental coach service. American Airlines and United Air Lines have filed identical $80 excursion fares, and Northwest Airlines has cut its coach fares between New York and Washington and Portland and Seattle to $80 providing the ticket is sold as part of a roundtrip international fare.



Ryan XF-109 Design Highlights

With outlines poorly concealed by a canvas covering, Ryan's XF-109 vertical takeoff fighter prototype moves from San Diego to Edwards AFB for flight testing.

Noticeable design features include the high delta wing with rounded center section, a deep, short fuselage and high triangular tail which serves also as one support pad for takeoff. Two other pads are built into the vertical structures at the wingtips. Unusual concentric exhaust nozzle of the Rolls-Royce Avon turbojet hints at the possibility of thrust augmentation or control during the vertical takeoff operation. XF-109 is third VTOL known to be turbojet powered.

USAF Orders Faster Evaluation Of Missiles to Speed Integration

Washington, D C—U S Air Force has taken official cognizance of its tardiness in integration of the guided missile into its air arsenal

In a new regulation (AFR 58-1) calling for faster evaluation of combat effectiveness "to determine the extent to which missiles can be profitably integrated into the Air Force," USAF's Chief of Staff, Gen Nathan F Twining has now ordered a program that is designed to exploit their capabilities to the fullest.

"Manned aircraft techniques have, of necessity, been the basis in the past for most of the development practices and planning for the use of missiles," the regulation says "Reluctance to depart from such development practices and planning procedures may prevent maximum progress."

To overcome this deficiency, the regulation orders integration of missiles with manned aircraft to "achieve operational capabilities as soon as possible"

There will be no waiting for the industry to produce test quantities Strategic Air Command, Tactical Air Command and Air Defense Command are ordered to get under way with operational exercises while the new weapons still are in the research and development stage

The commands will set up a limited number of guided missile operational units to produce data that will speed their integration

USAF finds these advantages:

- **They can be concealed and dispersed** to reduce vulnerability before they are used
- **They fly so high and fast that it is** difficult to hit them with any existing weapon while in flight
- **Automatic guidance systems** now have 'acceptable accuracy."
- **They can be brought** into action quickly in case of attack
- **Range is sufficient** for offensive and defensive operations.

Results of the experimental work by the new operational units will result in a comparative evaluation of guided missiles and manned aircraft, the regulation says

The regulation is careful not to freeze the mission of any missile. It makes these observations about three different types:

- **Missiles for strategic bombing** will be operated mainly from fixed launching sites against fixed targets Major goal is to get them into action quickly in case of emergency and keep firing at a high rate
- **Missiles for tactical bombing** will have guidance systems that provide maximum flexibility in shifting from one target to another. Some tactical missiles may be used for reconnaissance
- **Air defense missiles** must have long shelf life be capable of fast launching high speed and hit a fast moving target.

The regulation calls for faster development of missile capabilities with emphasis on planning and programming for production, provision of equipment and training

British IGY Plans

British scientists recently announced plans to explore the upper atmosphere by launching rockets from high altitude balloons sometime within the next three years

The experiment said to be much less expensive than the American "satellite" method will be conducted at the Woomera, Australia, testing site as part of the Anglo-Australian program for the International Geophysical Year during 1957 and 1958.

The plan is to send a small instrument-crammed rocket-powered by solid rather than liquid fuel—to a height of approximately 70,000 ft attached to a large balloon Radio-firing of the rocket from this point is expected to propel it to 300,000 ft, some sixty miles high

The British also are considering launching rockets from Antarctica to test electric charges in the atmosphere over that territory.

Titanium 'Break-Through' Near

Washington, D C—A new 'breakthrough' in research and development which could greatly accelerate the demands of the aircraft industry for titanium "is closer than has been supposed," a staff study by the special Senate Subcommittee on Minerals and Materials claimed last week

"It definitely appears that research and development programs promise shortly to develop titanium alloys with physical properties superior to those presently required by the aeronautical industry," the report stated It is based on a series of off-the-record conferences during April and June with representatives of aircraft and engine firms, the Department of Defense Office of Defense Mobilization and the titanium industry

The aircraft industry, Defense Department and Air Force were criticized Calling on the Aircraft Industries Assn to formulate an energetic program to make known the aircraft industry needs for the manufacture of improved military aircraft, the report said that at the time of the conference, AIA "had not even taken a look at the titanium situation for six or eight months."

The Defense Department has failed to take "a strong enough lead," the report added and in government agencies there is "a maze of red tape, routing and timidity."

A contributing factor to the lack of coordination and direction in the titanium program, the report declared, has been "vacillation and an apparent spirit of 'let George do it,' within the Air Force itself, as administered by Secretary of the Air Force Harold Talbott."

The report quoted these findings by experts of one airframe manufacturer

- "Great strides have been made in melting and fabricating titanium within the past six months
- "Most of the technical data regarding titanium in company files which is more than six months old is in the main unreliable."
- "Titanium in mill forms, forged and extruded shapes, with satisfactory physical properties is now available for order."
- "The state of the titanium fabricating art at their own plant level was inadequate misleading and obsolete until quite recently."
- "Titanium alloys with physical properties exceeding present requirements for airframe use are in the laboratory stage and will be available for production use in the near future."

The study urged that "every effort" be made toward reducing the cost of titanium sponge and effectuating greater scrap recovery It commented that it seems probable that a substantial decrease in cost may only be accomplished through the development of radically different processes such as the production of titanium powder or metal on a continuous scale rather than by batch production." The report urged substantial government aid to fabricators in envolving new methods, as well as to producers of primary titanium

Failure in the communication of know-how, the study declared, is another major bottleneck "Each company seems to have solved certain practical problems on the shop level with which other companies still are wrestling," it commented

National Aircraft Show Awaits Record Crowd at Philadelphia

Philadelphia is getting ready for the biggest National Aircraft Show in history. Speculation is that as many as 750,000 persons will visit the show at International Airport Sept. 3-5. The 1954 display at Dayton, Ohio, drew 200,000 viewers.

The aircraft industry and the Defense Department are co-operating to present both static and flying demonstrations of the latest advances in aircraft and equipment.

The big advantage of Philadelphia over previous midwest sites such as Dayton and Cleveland is that it is in the heart of the most densely populated area of the nation.

Show sponsors expect this year's events will draw visitors from New York and New England to points south of Washington. While the population is far more concentrated in this area, it is also true that the northeast is less air-minded than other parts of the country.

Many industrial participants, as well as the Defense Department, hope the show will help popularize aviation in this industrial region.

It was the Pentagon that shifted the scene through its ruling of a year ago that it would continue participation only if the National Aircraft show moved to another part of the country.

Philadelphia officials claim they are taking proper steps to control traffic to and from International Airport. The city has sufficient hotel accommodations, overcoming one of the major objections to Dayton as a site for the show.

Air Show Events

U. S. Air Force will continue to lead the military services in the extent of participation. In addition to more than 200 aircraft taking part in aerial and static demonstrations, pilots and F-100C Super Sabres of the Tactical Air Command will monopolize the Bendix Trophy speed race on Sept. 3, opening day of the show.

The TAC pilots will start their run this year from George AFB, Victorville, Calif., 2,325 statute miles from Philadelphia.

Their goal will be to beat the present record of 652 mph. set by Lt. Col. Robert R. Scott in an F-84F Thunderstreak on a flight from Los Angeles to New York last Mar. 9.

Previous Bendix race record was set last year by Capt. Edward Kenny of the Air Training Command, who flew an F-84F from Edwards AFB, Calif., to Dayton at 616 mph. This year's plane, the F-100, holds the official world speed record of 755 mph. over a 15-kilometer course.

Other major events:

- **Thompson Trophy** event will be a speed run by an F-100C Super Sabre over a straight 15 kilometer course. The test will be simulated at Philadelphia and the actual run made at Palmdale, Calif., with the results announced at the show.
- **General Electric Cross Country Trophy** event will be a transcontinental speed dash by B-47 Stratojets from March AFB, Calif. to Philadelphia. It will be held Sept. 4. Pilots from the Strategic Air Command will participate. The event is a departure from previous GE trophy races which have been held over a closed course.
- **The Allison Trophy** will be awarded to the USAF crew that wins a jet engine change contest. Abandoning the speed trials entirely, the prize for 1955 will be awarded to the maintenance crew that can set the fastest time for installing a new power unit in a Lockheed T-33 jet trainer. Engine is the Allison J33. The contest will be held Sept. 4.

USAF also will show:

- **The Thunderbirds**, acrobatic jet precision flying team.
- **Release of an Republic F-84F** from the belly of a Convair B-36 bomber.
- **Aerial refueling of Boeing B-47** bomber.
- **Two planes making their first public appearance**, the McDonnell F-101 Voodoo and Lockheed C-130 Hercules.
- **North American F-86D** demonstrat

Rules of the Air

Philadelphia—Weather limitations set for USAF participation in the National Aircraft Show are a minimum ceiling of 2,500 ft. and five mi. visibility. This will apply not only to the scene of the 1955 demonstration but also to the scattered bases from which participating aircraft will depart.

None of the aircraft will carry live ammunition and external fuel tanks will be safetied so that they cannot be dropped by accident. A Grumman SA-16 and Sikorsky H-19 helicopter will stand by for emergencies.

Safety rules have been promulgated by Brig. Gen. Ralph O. Brownfield, coordinating officer for the Defense Department.

ing high speed climb with afterburner
- Simulated low-level attack by Martin B-57 bombers
- Simulated interception by Lockheed F-94C all-weather fighter
- Aerial review including the Northrop F-89 Scorpion, F-84F Thunderstreak, F-86F Sabre and Lockheed RC-121 radar picket plane
- Six ground displays including 22 aircraft and demonstrations of USAF equipment

Navy To Send Carrier

Featuring U.S. Navy participation will be the aircraft carrier Ticonderoga, anchored at a pier near the airport on the Delaware River. The ship will be open to the public each day from 9 to 11:30 a.m. and planes will be launched from the catapult to take part in the air show.

Three flying units of the U.S. Marines will take part in the show. From the Ticonderoga's deck they will catapult the McDonnell F2H-4 Banshee and land before the crowd, using the Mirest field arresting gear. Their program also will include a helicopter assault operation carried out from the carrier deck to the airport, where the Marines will be given simulated air support and cover by Grumman F9F-8 Cougar fighters.

Marine Flyby

The Marines will stage a flyby of all their operation aircraft. The new portable dome hangars will be used on the field to house static exhibits.

Navy's contribution will include 16 missions flown by currently operational aircraft. The list was not complete last week, and a Pentagon Navy spokesman said he was not sure all types would be represented. Among possible features was a demonstration of how boundary layer control improves aircraft performance, a refueling demonstration and flybys of Navy planes and a dirigible.

Highlight of the Navy program will be an appearance of the Blue Angels precision aerobatic team.

U.S. Army aviation plans an exhibition of how it uses both planes and helicopters similar to last year's Dayton performance. Top billing goes to the helicopter square dance, autorotational landings and a simulated battle problem. Latter will include a river crossing, wire-laying, medical evacuation, resupply and simulated atomic artillery explosion.

Sabres to South Africa

Canada, Inc., sold 34 Mark VI Sabres to the Union of South Africa's Air Force. Value of the order totaled approximately $10 million.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Lockheed
North American
Philco
Piasecki
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R.C.A.
Republic
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Western Electric
Westinghouse
B-47 DC-6 C-123 P2V-7 RB-66 1649A F-104 A3D 34D XFY-1 C-124
KC-135 F-102 F-84F F-100 F7U B-52 DC-7 C-135 C-130 H-21 F8U
F9F-8 707 717 B-36 B-58 1F102 129 XF2Y-1 R3Y-1 24D C-131D
B-66 A4D F4D-1 DC-6B C-132 C-133 F3D-2 AD-4 AD-5 AD-6
F11F-1 F-94C F-107 RF-84 F-105 H-25A S-55 S-56 S-59 T-37
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Government's Airport-by-Airport Distribution of $20 Million Fund

Federal grants totaling $20 million for 205 communities have been awarded by the Commerce Department in the first allotments of the fiscal 1956 Federal airport aid program.

Programming of another $42,500,000 authorized for this year (AW Aug 16 p 124) is expected to be completed within the next three months.

The program includes $14,737,500 which was apportioned to the states under the statutory area population formula and $4,912,500 assigned to high priority projects from the discretionary fund. Alaska, Hawaii, Puerto Rico and the Virgin Islands received the remaining $350,000.

An airport-by-airport breakdown of the $20 million appropriation follows:

ALABAMA

Decatur & Athens Pryor Airport	$ 22 500
Huntsville and Madison County Municipal Airport	10 000
Bates Field, Mobile	65 000

ARIZONA

Flagstaff Municipal Airport	$ 34 540
Tucson Municipal Airport	273 592
Phoenix Sky Harbor Municipal Airport	204 432

ARKANSAS

Fort Smith Municipal Airport	$ 20 000
Adams Field, Little Rock	142 000
Texarkana Municipal Airport	48 000

CALIFORNIA

Buchanan Field, Concord	$ 15 790
Fresno Air Terminal	200 000
Long Beach Municipal Airport	100 000
Los Angeles International Airport	209 221
Merced Municipal Airport	54 210
Modesto Municipal Airport	150 000
Oakland International Airport	200 000
Ontario International Airport	104 389
Riverside Municipal Airport	17 996
Lindbergh Field, San Diego	57 838
San Diego County Gillespie Field	78 865
San Francisco International Airport	81 315
San Jose Municipal Airport	124 005
Orange County Airport Santa Ana	18 972
Stockton Field, Stockton	78 870

COLORADO

Montezuma County Airport Cortez	$ 22 780
Stapleton Field, Denver	105 800
Pueblo Municipal Airport	18 000

CONNECTICUT

Danbury Municipal Airport	$ 17 000
Meriden Municipal Airport	14 000
Bradley Field, Windsor Locks	90 648

DELAWARE

New Castle County Airport, Wilmington	$ 23 231

FLORIDA

Meacham Field, Key West	$ 85 000
Orlando Municipal Airport	15 000
Fannin Field, Panama City	21 790
Pinellas County International Airport, St Petersburg	20 000
Hillsborough County International Airport, Tampa	155 000

GEORGIA

Albany & Dougherty County Municipal Airport	$ 35 000
Clarke County Municipal Airport, Athens	8 000
Fulton County Airport, Atlanta	42 000
Malcolm McKinnon Airport, Brunswick	14 000
Travis Field, Savannah	30,000

IDAHO

Idaho Falls Municipal Airport	$147 728

ILLINOIS

Cairo Municipal Airport	$ 10 100
Chicago's O'Hare International Airport	100 100
Chicago Midway Airport	20 000
Peoria Airport Authority Municipal Airport	211 000
Quincy Baldwin Field, Quincy	25 000
Rockford Municipal Airport	42 000

INDIANA

Weir Cook Municipal Airport, Indianapolis	$215 000
Marion Municipal Airport	71 000
St Joseph County Airport, South Bend	45 000

IOWA

Clinton Municipal Airport	$ 5 030
Des Moines Municipal Airport	43 113
Dubuque Municipal Airport	10 240
Estherville Municipal Airport	10 750
Fort Dodge Municipal Airport	17 000
Iowa City Municipal Airport	9 000
Waterloo Municipal Airport	11 250

KANSAS

Chanute Municipal Airport	$ 55 000
Lawrence Municipal Airport	125 000
Phillip Billard Airport, Topeka	11 300

KENTUCKY

Greater Cincinnati Airport, Covington	$188 593
Blue Grass Field, Lexington	52 000
Barkley Field, Louisville	200 175
Barkley Field, Paducah	25 000

LOUISIANA

Moisant International Airport, New Orleans	$205 923
Shreveport Downtown Airport	6,000

MAINE

Bar Harbor Municipal Airport	$ 22 000
Caribou Municipal Airport	17 875
Portland Municipal Airport	25,250

MARYLAND

Baltimore Friendship International Airport	$137,024

MASSACHUSETTS

Beverly John Mountain Airport	$ 7 250
Logan International Airport, Boston	200 000
Lawrence Municipal Airport	177 500
Norwood Memorial Airport	5 000

MICHIGAN

Escanaba Municipal Airport	$ 50 000
Kent County Airport, Grand Rapids	150 000
Ford Airport, Iron Mountain	40 000
Orgebic County Airport, Ironwood	25 000
Kalamazoo Municipal Airport	24 000
Capital City Airport, Lansing	125 000
Menominee County Airport	20 000
Muskegon County Airport	30 000
Pontiac Municipal Airport	30 000

MINNESOTA

Eveleth-Virginia Municipal Airport	$ 65 000
Grand Rapids Municipal Airport	91 000
Worthington Municipal Airport	85 000

MISSISSIPPI

Greenville Municipal Airport	$ 30 000
University of Mississippi Airport, Oxford	100 000

MISSOURI

Columbia Municipal Airport	$ 11,500
Joplin Municipal Airport	150 000
Kansas City Municipal Airport	300 000
Lambert-St Louis Municipal Airport	300 000
St Louis Meramec Valley Airport	100 000
Springfield Municipal Airport	30 000

MONTANA

Billings Municipal Airport	$ 42 763
Butte Municipal Airport	37 410
Great Falls Municipal Airport	6 000

NEBRASKA

Alliance Municipal Airport	$ 26 000
Beatrice Municipal Airport	9 000
Chadron Municipal Airport	50 000
Columbus Municipal Airport	18 001
Hastings Municipal Airport	24 000
Kimball Municipal Airport	20 000
McCook Municipal Airport	25 000
Omaha Municipal Airport	75 000
Thedford Municipal Airport	10,000

NEVADA

Elko Municipal Airport	$ 32 808
McCarran Field, Las Vegas	87 500

New Miles Jet Trainer

New two-seat side-by-side all-metal jet trainer shown here is the Miles M.100 Student, designed to RAF training standards. The plane can also be used as a four-seater for liaison duties. The prototype, which is reported to be half completed at the F. G. Miles works at Shoreham, Sussex, Great Britain, carries a single Blackburn-Turbomeca Marbore 2 of 880 lb. thrust. An alternate power arrangement calls for two 350-lb.-thrust Palas engines. Top speed is given as 300 mph., maximum endurance 3 hr., normal gross weight 3,100 lb. Wing span is 28 ft., length 27 ft., height 6.25 ft. This illustration is reproduced from an advertisement in The Aeroplane which says the actual prototype differs from the artist's version in having dihedral on the tail.

Reno Municipal Airport	175 612

NEW HAMPSHIRE

Dillant-Hopkins Airport Keene	$ 28 000
Lebanon Municipal Airport	24,631

NEW JERSEY

Newark Airport	$300 000
Mercer County Airport, Trenton	150,000

NEW MEXICO

Farmington Municipal Airport	$ 33 007
Hobbs Lea County Airport	12 427
Lovington-Lea County Airport	18 874
Santa Fe Municipal Airport	280 767

NEW YORK

Buffalo Municipal Airport	$100 000
Chemung County Airport Elmira	12 500
Jamestown Municipal Airport	75 000
International Airport New York	300 000
LaGuardia Airport	300 000
Niagara Falls Municipal Airport	30 000
Ogdensburg Municipal Airport	105 000
Rochester Monroe County Airport	225 803
Saranac Lake Airport	65 000

NORTH CAROLINA

Asheville	$130 000
Raleigh Durham Airport	115 000
Smith Reynolds Airport Winston Salem	67 150

NORTH DAKOTA

Bismarck Municipal Airport	$ 30 100
Fargo Hector Airport	63 000
Grand Forks International Airport	90 000
Sloulu Field Williston	25 000

OHIO

Akron Municipal Airport	$ 97 265
Cleveland Hopkins Airport	300 000
Port Columbus, Columbus	300 000
Dayton Municipal Airport	178 920
Scioto County Airport Portsmouth	47 500

OKLAHOMA

Bartlesville Frank Phillips Airport	$ 23 000
Will Rogers Field Oklahoma City	110 000
Tulsa Municipal Airport	160 000
Tulsa Municipal Airport No 2	300 000

OREGON

Mahlon Sweet Airport Eugene	$185 000
Medford Municipal Airport	34 500
Portland International Airport	300 000

PENNSYLVANIA

Port Erie	$105 000
State Airport Harrisburg	50 000
Lancaster Municipal Airport	52 500
Philadelphia International Airport	500 000
Greater Pittsburgh Airport	122 500
Allegheny County Airport Pittsburgh	100 000
Williamsport Municipal Airport	145,975
York Municipal Airport	200 000

RHODE ISLAND

T F Green Airport Hillsgrove	$ 45 400

SOUTH CAROLINA

Anderson Municipal Airport	$ 47 500
Columbia Municipal Airport	2a 000
Sumter Municipal Airport	31 000

SOUTH DAKOTA

Aberdeen Municipal Airport	$ 42 400
Lemmon Municipal Airport	13 200
Philip Municipal Airport	7 500
Rapid City Municipal Airport	25 550
Watertown Municipal Airport	5 000

TENNESSEE

Tri City Airport Bristol	$ 70 000
Lovell Field Chattanooga	0 000
Memphis Municipal Airport	222 000
Berry Field Nashville	25 000

TEXAS

Abilene Municipal Airport	$ 71 000
Robert Mueller Airport Austin	260 000
Jefferson County Airport Beaumont	241 048
Houston International Airport	245 000
Gregg County Airport Longview-Kilgore	11 000
Lubbock Municipal Airport	1 000
McAllen Municipal Airport	3 100
Plainview and Hale County Airport	10 000
Mathis Field San Angelo	10 000
San Antonio International Airport	300 000
Pounds Field Tyler	30 000

UTAH

Moab Municipal Airport	$ 34 257
Salt Lake City Municipal Airport	203 000

VERMONT

Barre and Montpelier Municipal Airport	$ 31 000

VIRGINIA

Roanoke Municipal Airport	$ 20 000
Staunton Municipal Airport	250,000

WASHINGTON

Boeing Field Seattle	$100 000
Seattle-Tacoma Airport	200 000
Yakima Municipal Airport	181 000

WEST VIRGINIA

Kanawha County Airport Charleston	$ 32 375
Tri-State Airport Huntington	101 000
Morgantown Municipal Airport	200 000
Wheeling-Ohio County Airport	65 000

WISCONSIN

Fond du Lac County Airport	$ 32 503
Kenosha Municipal Airport	131 500
General Mitchell Field Milwaukee	161 000
Osceola Municipal Airport	16,280
Stevens Point Municipal Airport	14 000

WYOMING

Casper Air Terminal	$ 52 485
Cheyenne Municipal Airport	38 721
Newcastle Mondell Field	12,320
Powell Municipal Airport	55 477

ALASKA

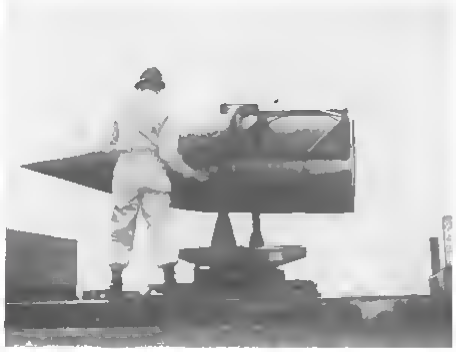
Petersburg Seaplane Base	$ 75 000
Municipal Airport Bethel	14 370

HAWAII

General Lyman Field Hilo	$ 12 500
Honolulu International Airport	232 500
Molokai Airport, Kaunakakai	43,304

PUERTO RICO

San Juan International Airport	$100 000



CORPORAL WARHEAD on truck gets check out by battalion officer

MISSILE ERECTOR is remotely-controlled by technician at left.

U.S. Corporal Battalion Set to Go in Germany

CORPORAL launching unit on its truck.

MISSILE locked in place aboard launcher.

WITH CORPORAL in vertical position, erector noses missile onto launcher ready for firing.

By Gerald W. Schroder

Bonn—A recent field demonstration by U S Army Forces in West Germany of the first surface-to-surface missile unit to be assigned to a tactical army revealed hitherto undisclosed details.

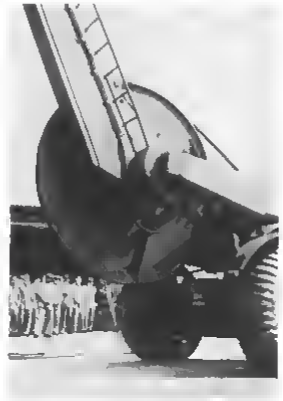
The unit, the 259th Field Artillery Missile Battalion (Corporal), is under the command of Lt Col Glenn B Elliott and stationed in the central part of West Germany within the 7th Army command.

The 259th, which is made up of 500 highly skilled officers and men, arrived in Germany early this year after training at Ft Bliss Tex. Although the battalion has not actually fired the Corporal in Europe, it is expected that a test firing will take place soon. Suitable ranges are reported to exist on the continent, possibly in Germany itself.

The assignment of the Corporal battalion to the 7th Army adds power "in excess of several thousand artillery rounds fired at the same time," Aviation Week was told. The missile warhead can be atomic or conventional type.

The weapon's mission is to furnish tactical support to the field forces. It is handled like any other regular artillery weapon under the jurisdiction of the respective Army tactical commander. Its striking force, range and capabilities make it the Army's major artillery support weapon. The battalion is completely mobile, a factor which increases its adaptability under combat conditions.

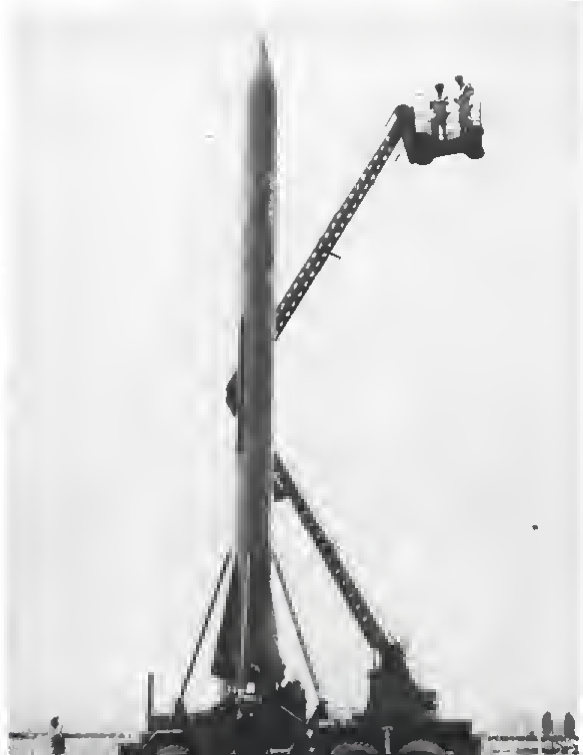
The battalion cannot be air lifted

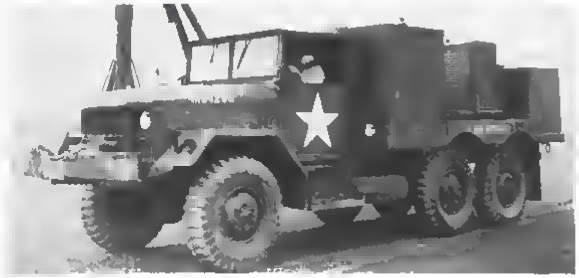


ERECTOR DRUM dwarfs men in background

ERECTOR ARM moves towards vertical launching position with Corporal missile in tow.

MISSILE, set onto launcher by erector, is checked by officers riding inspection tower.





HEAVY-DUTY TRUCK carrying critical electronic equipment for Corporal missile

at the present time, apparently because of the weight and size of the over 30 ton erector unit that sets the Corporal up for firing.

The Corporal's range is classified, but is known to be "in excess of 20 miles."

The Battalion

The Corporal battalion consists of a headquarters battery, which is the command unit and directs actual firing of the missile, a service battery, which is charged with initial supply and resupply of fuel, missiles, warheads and equipment, and two missile batteries.

Duties of the missile batteries are broken down this way:

- **Ammunition sections** receive the missile, mate it, fuel it, mate warhead to missile. All of this is done at the launching site.
- **Assembly, test and repair section** performs all preflight checks on electronic and fuel components.
- **Launching platoon** takes over in the next to last stage. It erects missile erector with on launcher, performs final go-no go checks and launches.
- **Guidance platoon** guides the airborne missile to target. Average IQ of the entire battalion is higher than that required for entrance into Officers Candidate School and the Guidance Platoon has the highest number of college graduate and skilled technicians.

The Missile

The Corporal itself consists of three basic components: the warhead at the very tip, the propulsion system in the center section and in the tail the supersonic rocket motor which combines the fuels and builds up thrust.

Whether the warhead is to be conventional or atomic is determined by higher headquarters on the basis of the local situation and needs. Since the Corporal unit is part of the NATO forces, any decision to use an atomic warhead will come from NATO rather than from a subordinate headquarters. Day-to-day training is carried on along conventional warhead lines.

The missile and its warhead are shipped in separate containers. The missile, which comes in a pressurized "can," is drawn—along with all other components—from regular Army ordnance sources such as ammunition dumps.

One ordnance ammunition company is the regular support unit for the battalion. Another ordnance company (direct support guided missile) supports the battalion in the maintenance and supply of items peculiar to the missile itself.

On the Firing Line

The demonstration "firing" of the Corporal witnessed by AVIATION WEEK included everything but the actual launching of the missile itself.

Here within the limits of security regulations, are the steps leading to the launching:

- **Missile** is removed from pressurized can and placed on 1 set of rails—the "missile rail."
- **Assembly** commences, fins, antennas and other miscellaneous items are added.
- **Complete checkout** of electronic and propulsion units is run.

DRUMS OF ANILINE fuel for Corporal missile being towed onto launching site.

- **Missile** is fueled with aniline and red fuming nitric acid.
- **Warhead** work is performed and warhead gets complete checkout.
- **Missile** is removed from missile rail on the erector and placed on launcher.
- **Final** overall missile check is performed.
- **Corporal** is launched.

Details of actual fueling and launching procedures are highly classified, but it can be stated that an "airbottle truck" which is capable of storing air at pressures of 3,500 psi, forces air into the missile. At the go signal the compressed air forces the aniline and red fuming nitric acid together and into the motor in the aft section.

The missile is guided by radar from launching to impact. The ground crews know at all times where it is and what it is doing.

Storage and maintenance problems are no better or worse than those of a normal artillery unit in the field, AVIATION WEEK was told. Although the equipment is heavy and in many respects complicated, the battalion is completely mobile and can operate regardless of weather conditions.

The Corporal has taken its place solidly as a normal artillery weapon in "the Army thinking."

Engineer Salaries Show Slight Rise

Salaries for engineers and other professional employes are 4.5% higher this year than last, according to a survey just completed by the Executive Compensation Service of the American Management Assn.

Electrical and mechanical engineers rate tops in the salary survey. Median pay for these groups is $7,000. For chemical engineers it is $6,500; for industrial engineers $6,000. The average engineering beginner gets $4,500 upon reporting from college campus.

The spread in salaries reported is "surprisingly narrow," AMA's study says, "considering the great demand for and short supply of professional personnel."

The study covered 20 engineering and professional job classifications in 19 industries among AMA's 21,000 members. The pay level for these positions was found to be about the same as that of production foremen. Salaries do not vary much with industries, company size or location for these positions but like those of foremen and "middle management" personnel tend to be similar for similar jobs.

However only a fifth of the professional people got bonuses this year, compared with a fourth of the foremen and two-fifths of middle management executives.

Italian Ariete Jet To Be Supersonic

Rome—The Ariete light fighter interceptor prototype under construction by Aerfer in Naples will be capable of supersonic speeds according to preliminary details released by the company.

The swept wing jet has two engines: one an auxiliary to provide a reserve of speed and maneuvering ability. Armament, it is believed, will consist of rockets and bombs plus two 30-mm. cannon when the plane is used for tactical support. Length is a little over 30 ft., the wingspan 24.5 ft., according to the Rome newspaper Il Tempo.

The Ariete design is a refinement of the Sagittario 2 light fighter built by Aerfer and will be followed by a series of seven later ships. Plans call for each succeeding model to incorporate lessons learned in the preceding ones.

Three Firms 'Lend' Ryan Skilled Help

Three aircraft firms in various parts of the country have "lent" Ryan Aeronautical Co., San Diego, 120 tool designers, engineers and jig and fixture builders to help in tooling up to construct large fuselage sections of the Boeing KC-135 jet tanker.

The men, all in critical job categories difficult to fill locally, will spend the remainder of the summer working on the tanker which requires the largest jigs in Ryan's history.

The contingents are from Lockheed Aircraft Co., Marietta, Ga.; Boeing Airplane Co., Seattle and Wichita; and Temco Aircraft Co., Shawnee, Okla.

ARDC Getting Big Flight Simulator Lab

An electronic testing and flight simulation laboratory, described by its builder as the largest and most modern in the U. S., is expected to begin operation within a year at Wright Air Development Center, Ohio. The Reeves Instrument Corp., Inc., of New York, will build the laboratory for the Air Research and Development Command.

The new center is designed for handling the specific problems involved in the development of weapon systems for the Air Force. Using computers, it will pre-evaluate the tactical feasibility of new designs. It will incorporate all of the most advanced electronic computer techniques, according to Reeves. The lab's computer will have more than 500 operational amplifiers which, with associated equipment, makes it larger, faster and more versatile than any of this country's other large scale differential analyzers, a company spokesman said.

Among the innovations is a Reeves-developed system to check not only the problem but subsequent phases of computer performance. Multiple time scales are available as are indications that computing components have been used in their optimum range, and typewriter keyboard devices for setting scale factors and arbitrary functions of several variables into the machine.

An automatic programmer permits operators to perform large numbers of runs without resetting controls or problem parameters. A patch board verifier, developed by L. M. Warshawsky and W. G. Braun of WADC's Aeronautical

Reborn Spirit of St. Louis

The Spirit of St. Louis, most famous monoplane in the world, is flying again these days over Long Island.

Ship shown here being inspected by Charles Lindbergh is one of three constructed for filming of his Pulitzer Prize-winning book about the first solo trans-Atlantic crossing. It was rebuilt by Paul Mantz from a Ryan Brougham at a reported price of $40,000 using the blueprints prepared for the original plane. Brougham wings were extended 2.5 ft. on each side so span is 46 ft., same as on the original craft. Engine is a Whirlwind J5 turning a Hamilton Standard metal prop.

The movie model must be photographed from the right side only, as a pilot's position has been engineered into the nose on the left side (see picture) for the pilot who will actually fly the plane while 'Lindbergh' factor James Stewart) is photographed doing it. Lindbergh had to use a periscope to see forward in the original Spirit of St. Louis.

Mantz, who is handling the aerial photographs, is also building one of the other replicas, and actor Stewart and Joe de Bona are building the third.

The camera crews had to wait for bad weather, duplicating the conditions of the original flight, for aerial photographs over Long Island, New England and Nova Scotia. A major problem has been the anachronistic rooftop TV antennas which spoil authenticity of air to ground shots. The movie company is building a new "Roosevelt Field" in Texas and "Le Bourget" near Paris for realism.

After filming is completed in this country the replica will be air freighted to Paris for French sequences.

A Moth Major, said to be the same plane that photographed Lindbergh's exploit for Pathe News, will play the same role in the picture. Mantz will work from a modified L-1.

Research Lab provides automatic digital verification of computer patching for particular problems and gives a printed record of machine setup. The computer detects its own malfunctions and pinpoints them for correction by the operator.

The large integrated computer will consist of four sections which may be used separately or in any combination.

German Border Guard Buys First Helicopter

Bonn—Germany's crack Federal Border Guard has purchased and imported its first helicopter, a Hiller UH12B. The copter was purchased from Hiller through the Cologne firm of Luftfahrt-Technik GmbH.

The copter is now stationed at Bonn's Hangelar Airfield and will be used for a variety of purposes—border patrols, liaison and routine police work, traffic control and emergency investigations in accessible territory.

One pilot and one mechanic have been trained thus far by a Swiss instructor. A second pilot-mechanic team is now in process of training. Both pilots are ex-Luftwaffe pilots. The Border Guard is not planning purchase of additional helicopters in the "foreseeable future," however, since the unit's budget is limited.

Convair Studies Noise Effect on Materials

Convair-Ft. Worth is conducting research to determine the ultrasonic effects of jet engine noise and aerodynamic friction on aircraft materials.

The high frequency sound (20 kilocycles and up) is being studied for its effect on fuels, lubricants, hydraulic fluids, plastics, adhesives and on the explosive limits of fuel.

Test tube samples are immersed in a coupling fluid where they are subjected to radiation at the point of maximum energy. Energy absorption is evidenced by the release of dissolved gases, cavitation and its resultant geyser on the specimen surface and by a vapor above the liquid.

Tests are made on the samples before and after ultrasonic exposure to determine changes produced.

Italian Missiles

Italian guided missiles activity has gotten new impetus with granting of a license by Oerlikon, Swiss armament firm, to Centrales Italiana and award of study contracts by USAF to School of Air Engineering, Rome, for high speed ballistics research.

Solar-Bristol Join in Afterburner Pact

By Irving Stone

San Diego, Calif.—Bristol Aeroplane Co. Ltd., one of Britain's prime engine developers, is establishing itself in the afterburner field, building on a framework of wide design and production experience amassed by an American company, Solar Aircraft Co.

An agreement between Solar and Bristol covering afterburner development and licensing has just become effective, with approval by both the U. S. and British governments.

Contract involves approximately $1 million and will run for about eight years. Initially it is believed to involve afterburner development for engines in the Bristol Olympus series.

Under the agreement, Solar will:

- **Give its know-how** in design and production of afterburners to Bristol.
- **Design and build** several pre-prototype afterburners for extensive test stand runs at Bristol.
- **Assist Bristol** in its development work, starting with these pre-prototype afterburners, advising on modifications and any other phases of the Bristol program.
- **Deliver to Bristol** additional afterburners, controls and components in connection with the development program.
- **License Bristol** to use Solar's patents and proprietary designs relating to afterburners. In connection with the transfer of these rights, Solar will supply consultation service for a period of years.

Also, Bristol will be permitted the right of sub-license in the United Kingdom and in Europe, subject to Solar's approval. Guide to the latter condition will be obtainance of security clearance in this country.

Contract negotiations had been going on for more than a year.

Working on it for Bristol were Air Commodore F. R. Banks, technical director, Dr. Stanley G. Hooker, chief engineer, and A. J. Hunt, commercial services manager.

For Solar, Edmund T. Price, president and general manager, Herbert Kunzel, executive vice-president, Paul A. Pitt, chief engineer; and Patrick Johnson, manager of the company's European division.

All of the Bristol representatives visited Solar during the negotiations.

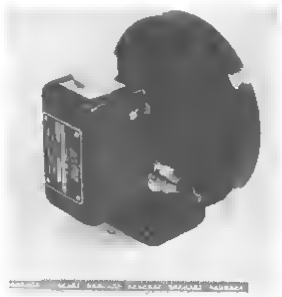
Bristol already has sent specifications to Solar on two engines. Bristol would like an afterburner designed so that it would be applicable to both powerplants—a difficult assignment, since even teaming one afterburner to different models of the same engine is no easy job.

OFFICIALS DISCUSS AFTERBURNER AGREEMENT—Solar representatives are Edmund T. Price, pres. gen. mgr. (right) and Paul A. Pitt, chief engineer (left); from Bristol, Dr. Stanley G. Hooker, chief engineer (right center) and unidentified official.

While fitting this afterburner for a dual role will be an objective of the program, Bristol has been requested to specify which of the two powerplants the initial afterburner is to be specifically designed for, so that at least it will do a prime job for this engine.

Only broad principles of the design have been formulated thus far by Solar engineers. Further design aspects will be firmed soon—after the arrival at Solar of a Bristol liaison team, who will have to be cleared with the Air Force.

Specific design for the initial afterburner should be completed sometime this summer, allowing time for Bristol's revisions or approval.



MICROJET CONTROL, which automatically monitors engine pressure conditions, will be incorporated in Solar jet afterburner development for Bristol.

Work on the pre-prototypes will start immediately after design approval. American standard parts and materials will be used. It probably will be late fall before any afterburner is delivered to Bristol under the program.

The afterburner development projected under the agreement will incorporate controls based on the Microjet system Solar has developed.

This is an automatic, pneumatically operated device which controls afterburner fuel flow and the variable nozzle in relation to the main engine for various flight conditions. AVIATION WEEK has learned. American engine builders who are using or have shown interest in, the device include Pratt & Whitney Aircraft, Westinghouse, Wright Aeronautical, General Electric and Allison.

Solar says Microjet "computes by itself under all flight conditions exactly what the turbine discharge pressure should be—and at the same time notes any error between the actual engine pressure and what it should be. If there is an error, the Microjet automatically sends out electrical signals to other engine controls which correct the pressure conditions."

In connection with the afterburner testing phase of the development program, Solar will have a technical team at Bristol. These representatives may remain there for at least a year.

It is Bristol's intention to become self-sufficient insofar as continuing de-

BRISTOL commercial sales mgr., A. J. Hunt (left) and Solar exec. vice president, Herbert Kunzel, pose with afterburner.

velopment work is concerned and it will absorb responsibilities as it goes along relying on Solar's guidance in consultation.

Anything Solar learns as a result of the agreement—either from its own development contributions or from Bristol's work—may be applied to Solar's afterburner activity in this country.

Pioneer in the afterburner field, Solar has produced a total volume of these units with an aggregate value of more than $35 million.

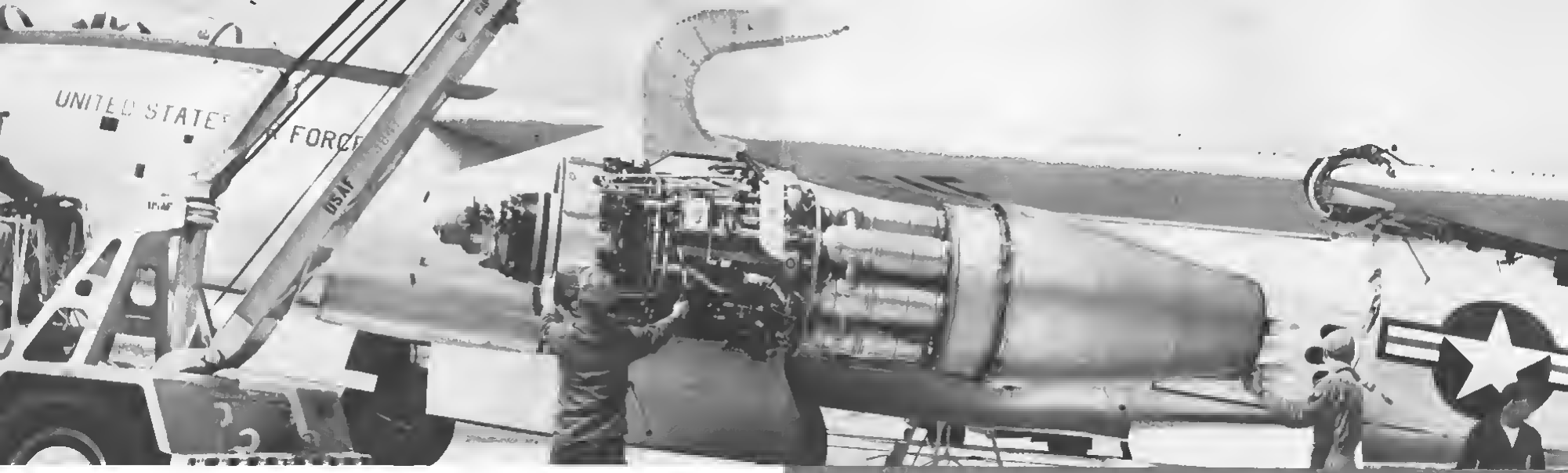
Solar afterburners were the first to fly in both Navy and Air Force planes.

J46 Jet Production Resumes After Strike

Westinghouse Electric Corp.'s aircraft gas turbine plant in Kansas City has resumed operations after a nine-week strike which was settled with the signing of a new contract with the United Automobile workers (AW Aug. 22, p. 7).

An immediate wage increase was granted amounting to 6 cents an hour plus 3 cents for wage inequities in a three-year contract running until Nov. 1, 1958. A further increase of 6 cents and 3 cents is provided for on Nov. 1, 1956 and another increase of 6 cents and 1 cent a year later. The contract also includes a company paid pension plan, modified union shop and other benefits.

Westinghouse is finishing orders for the J46 jet engine at the Kansas City plant as well as turning out spares and parts in support of engines already in the field. Conclusion of the strike has also permitted resumption of work on the $12.5 million research and development laboratory Westinghouse has under construction.



At Pinecastle AFB, all six J47's on B-47 pass

1000 HOURS WITHOUT OVERHAUL

Estimated 490,000 miles flown by each G-E engine installed on Boeing Stratojet No. 51-2076, part of SAC's 19th Bomb Wing

Setting the pace for the growing durability of American turbojets, all six General Electric J47-GE-23's installed on a SAC B-47B recently passed 1000 hours without overhaul at Pinecastle AFB, Orlando, Florida.

These rugged J47's, operational since November of 1952, went through 600 hour inspection over a year ago with only minor parts replacement. At last report, all engines had approximately 1010 hours. Since each hour was flown at an estimated airspeed of about 490 mph, total flight distance of the B-47B has been more than 20 times around the world.

Used today in the North American F-86 and B-45 as well as the B-47, hundreds of J47's are nearing the 1000 hour mark. As a result of their outstanding performance, the Air Force has saved more than $100 million through reduction in the total number of engines required. Since 1950, improved production methods in G-E jet plants have saved another $50 million.

The J47 *typifies* G-E's key role in U.S. air power. Right now, operating experience from this turbojet is paying off on still newer engines in G-E test cells and on the drawing boards.

232-1

Progress Is Our Most Important Product

GENERAL ELECTRIC

STRATOJET #51-2076 was built at Boeing's Wichita, Kansas, factory. The aircraft has been flying training missions for over 30 months, including the first non-stop transatlantic combat readiness mission undertaken by a SAC B-47 Wing.

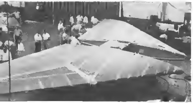
G-E TECH REPS who worked with SAC maintenance crews on the 1000 hr. B-47 are shown with the 19th Bomb Wing's Commanding Officer. From left to right, Supervisor Bill Wallace; Col. V. M. Cloyd, Jr.; Walt Duggan.

OVER 1000 B-47's at U.S. Air Force bases throughout the world, are now operational with SAC. In the past 7 years, G-E has supplied four different engine models—the latest 50% more powerful than ship's original jets.

SAC's LOW J47 ENGINE CHANGE RATE stems largely from close teamwork of USAF maintenance crews and G-E field service engineers. This teamwork has helped to raise J47 allowable operating time between overhauls to 1200 hours.

Stratofortress: Kansas Wing, Seattle Body

MASSIVE FUSELAGE SECTION of B-52 Stratofortress being lowered gingerly from crane onto floor jig for installation of parts and other equipment at Boeing Seattle.



B-52 HORIZONTAL stabilizer gets final touches at Cessna plant in Wichita.

B-52 INBOARD WING section at Boeing Wichita.

TWELVE STRATOFORTRESSES nearing final stage of assembly at Boeing Field, Seattle, before delivery to USAF Strategic Air Command. The 350,000-pound eight-jet bombers have a top speed of more than 650 mph and an unrefueled range of about 6,000 miles.

ALL THE B-52s are equipped with Boeing-developed Flying Booms for air-to-air refueling that provides intercontinental range. Production of B-52s was accelerated after U. S. government learned of startling new technological progress made by the Soviet air force.

USAF Contracts

Following is a list of recent contracts announced by the United States Air Force

Bendix Radio Div., Bendix Aviation Corp. Baltimore AN/ARC-33 UHF radio set complete spare parts test equipment, $728,588.

Hughes Tool Co., Culver City, Calif., acquisition and installation of a noise suppressor for the flight testing of interceptor fire control systems, $97,500.

Bridgeport Brass Co., Bridgeport, Conn., facilities for the production of forgings and extrusions, $75,000.

Motorola Inc., Chicago, spare parts, maintenance tools and test equipment for radar set, $1,775,726.

North American Aviation, Inc., Los Angeles 45, spare parts special tools mobile training unit and various related equipment, $251,260.

Radio Corp. of America, Los Angeles, components of AN/APN-70 and spare parts, $1,020,692.

Paramount Products, Inc., Peabody, Kan., trailers, fuel servicing, spares, 15 ea., $29,692.

Kollsman Instrument Corp., Elmhurst, N. Y., indicators, 633 ea., $28,405; indicators, vert., 1,615 ea., $116,867.

Weston Electrical Instrument Corp., Newark 5, N. J., temperature indicators, 2,282 ea., $89,014.

Nasco Inc., Miami, Fla., generators, aircraft engine, 1 ea., 136 ea., 26 ea., $60,429.

Goodyear Tire and Rubber Co., Inc., Akron 16, Ohio, brake assys., 138 ea.; wheel assys., 138 ea.; wheel assys., 40 ea., $59,275.

Varo Mfg. Co., Garland, Tex., D-4 power supplies spare parts data, $87,491.

Stewart-Warner Corp., Electric Div., Chicago, components of radio altimeter spare parts, $39,614.

General Electric Co., Schenectady, N. Y., constant speed drives, 10 ea., $296,700.

Lalno Electric and Mfg. Co., Jersey City 7, N. J., headset microphone adapter, $319,780.

Wm. R. Whittaker Co., Ltd., Los Angeles 38, actuators motors, $55,443.

Eclipse Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., indicators spare parts, $281,502.

Houston Fearless, Los Angeles, Calif., developing outfits, 10 ea., $57,644; temp. control units, 176 ea., $164,580.

Jack and Heintz, Inc., Cleveland, generators, tachometer, 1,153 ea., $58,528.

Weston Electrical Instrument Corp., Newark, N. J., indicators temperature exhaust, 2,579 ea., $192,515.

Scintilla Div., Bendix Aviation Corp., Sidney, N. Y., filter assys. and components, 1,063 ea., $2,335.

Massillon-Cleveland-and-Akron Sign Co., Massillon, Ohio, radar reflective tow targets, 3,350 ea., $434,697.

Sam Orleans and Associates, Inc., Knoxville, Tenn., production of motion picture project, 1 ea., $29,900.

Kearfott Co., Inc., Little Falls, N. J., incorporation of various spare parts for aircraft, $47,848.

Robhrauff and Ryan, Inc., New York 17, N. Y., purchase of classified ad space, $79,390.

Canadian Commercial Corp., Washington, D. C., L-20 airplanes and data, special tools, and GSE, 28 ea., $1,327,792.

Bendix Products Div., Bendix Aviation Corp., South Bend, Ind., wheel assys., 168 ea.; brake assys., 108 ea.; brake assys., 510 ea., $752,956.

General Electric Co., West Lynn, Mass., generators, 28 ea., 26 ea., control panels, 80 ea., $113,481.

American Air Filter Co., Inc., Herman Nelson Div., Moline, Ill., misc. spares for type A2 blower and BT 400 series portable heaters and GI heaters, 193 ea.; ducts complete 14-in. dia., 41 ea.; clip duct, 1,084 ea.; duct, 14-in. dia., 708 ea.; hose assys., exh., 128 ea.; name plates instruction, 133 ea.; name plates, instruction application, Type A2 blower, 133 ea.; prime mover assys., electric motor driven complete, 100 ea., $164,042; heaters, engine and shelter port., ground gasoline burning, gasoline engine driven variable output up to 400-900 Btu per hr., type H-1, 161 ea., $233,462; spare parts, $38,022.

Stanford Research Institute, Stanford, Calif., research on utilization of a solar furnace, $45,550.

Propulsion Research Corp., 1060 Franklin St., Santa Monica, Calif., theoretical and experimental supersonic flow studies related to turbomachine design, $97,833.

Aerojet General Corp., Azusa, Calif., a study of combustion instability in solid propellant rockets, $28,665; research on ultra energy fuels for rocket propulsion, $38,385.

Board of Trustees of the Univ. of Ill., Urbana, Ill., continuation of research theoretical study of the properties in insulating and conducting solids, $14,250.

Atlantic Research Corp., Alexandria, Va., research on solid propellant combustion, $46,410.

Antioch College, Yellow Springs, Ohio, a study of hydrothermal reactions, $50,000.

Boeing Airplane Co., Wichita, facilities for the production of B-47 and B-52 acft., $2,242,000.

Stewart-Warner Corp., South Wind Div., Indianapolis, facilities for the production of fuel cell purge gas generators, $31,000.

Gilfillan Bros., Inc., Los Angeles, communication kit for trainer, 1 ea., $66,406.

Radioplane Co., Van Nuys, Calif., auto pilot control seats, $71,569.

Cessna Aircraft Co., Wichita, procurement of static test airplane and services, $159,782.

Ford Instrument Co., Div. of Sperry Corp., Long Island City, N. Y., components of computer set latitude and longitude, $26,566.

Johnson Farr Box Co., Chicago 40, spare parts for gun charger, $45,636.

General Motors Corp., Allison Div., Indianapolis, spare parts, tools and equipment to be procured to support 385 A-37 type command engines, $100,000.

Keish Instrument Co., Inc., Baltimore, stereoplotter projection, 6 ea., $44,097.

Bendix Aviation Corp., Utica Div., Utica, N. Y., spare parts, $42,193.

Curtiss-Wright Corp., Propeller Div., Caldwell, N. J., retrofit kits, tools and revisions to manuals, $175,600.

Revel Art, Inc., Alhambra, Calif., tank assy., left hand; tank assy., right hand, 472 ea., $520,798.

Lear, Inc., Grand Rapids, Mich., indicators, 534 ea.; control roll and pitch, 600 ea., 384 ea., $2,248,315.

Mead Development Co., Davenport, Iowa, image adapter test set LM-20, 56 ea., $60,232.

Seymour Wallas and Co., St. Louis 4, tow target aerial banner radar reflecting, 1,000 ea., $25,840.

Warner News, Inc., N. Y. 22, N. Y., write script for motion picture project and compile storyboard, 20 ea.; produce motion picture, 1 ea., $25,161.

Lear, Inc., Grand Rapids, Mich., indicators vertical gyro, remote, 656 ea.; controls vertical gyro type K-4B, 224 ea., $2,339,240.

R. C. Allen Business Machines, Inc., Grand Rapids, Mich., indicators turn and slip type MD-1A, 240 ea.; indicators turn and slip, 166 ea.; indicators turn and slip, 97 ea., $71,071.

General Electric Co., Waynesboro, Va., regulator generator, 227 ea., 130 ea., 26 ea., $157,171.

Colonial Broach Co., Detroit, broaching machines, 3 ea., $192,350.

Munsion Mfg. and Service, Inc., Islip, N. Y., control panel C-411A, $48,001.

MPO Productions, New York 22, N. Y., write script for motion picture and production of motion picture, $40,061.

Oregon Industries, Inc., Oregon, Wis., mountings for radio set AN/ARC-3, $41,097.

Craven Film Corp., New York 16, N. Y., write script for project 101996, furnish storyboard, produce motion picture, $44,034.

Sperry Gyroscope Co., division of Sperry Corp., Lake Success, N. Y., stabilizer assembly A-1A bombing navigational computer, 150 ea.; transmitter true heading A-1A bombing navigational computer, 390 ea., $2,258,684; control roll and pitch, 87 ea.; spare parts, special tools and engineering and handbook data, $108,023; electronic control, 107 ea.; spare parts data, $548,185; flight computer indicator component, 79 ea.; control assy. component of flight computer, 50 ea.; amplifier, 72 ea.; control quick erector, 142 ea., $261,550; control roll and pitch, 12 ea.; control servo single motor, 15 ea.; motor and drive assy. servo, 348 ea.; handbook and engineering data, $668,307; amplifier, 94 ea.; installations spare parts and data, $480,677.

A. C. Spark Plug Division, General Motors Corp., Flint, Mich., amplifier stabilization, 281 ea.; control navigational, 140 ea.; synchronizer radar, 361 ea., $3,281,869; bombing system, 30 ea.; spare components,

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In guided missiles, Bell is prime contractor for the strategic, long range GAM-63 Rascal, one of the few contractors to undertake the *complete* weapons system assignment from airframe to rocket engine, from its electronic components and servos to ground-support equipment and training devices.

In one of the country's largest and best equipped rocket engine facilities, Bell has developed and is producing engines for the Rascal and Nike missiles as well as for other projects. The famous Bell series of high performance research aircraft — X-1, X-1A, X-2 and X-5 — is supplying today's information for tomorrow's tactical planes.

Improved Bell helicopters are serving every branch of the military services. The revolutionary XV-3 convertiplane will provide a link between fixed-wing and rotary-wing aircraft and the Bell jet VTOL (vertical takeoff and landing) promises to change the entire concept of military and commercial aviation, launching a new era of flight.

These and many other projects are being pushed forward to gratifying conclusions by a company founded on the premise of helping to make America strong. In hot war, cold war, or peace, Bell Aircraft's engineers, skilled factory workers and modern facilities work progressively toward protecting our American way of life. National Defense has always been, is now, and will continue to be *our business.*

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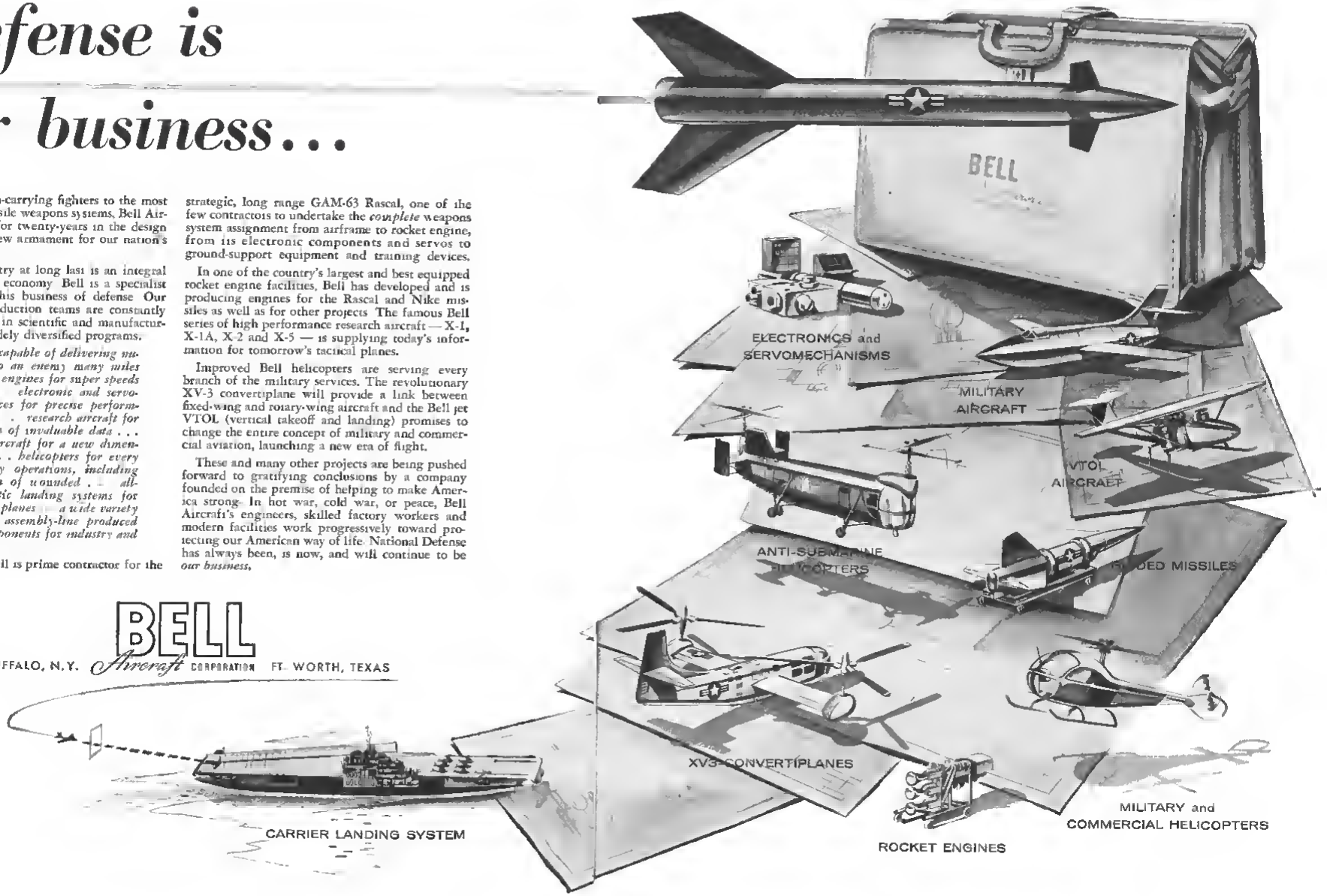
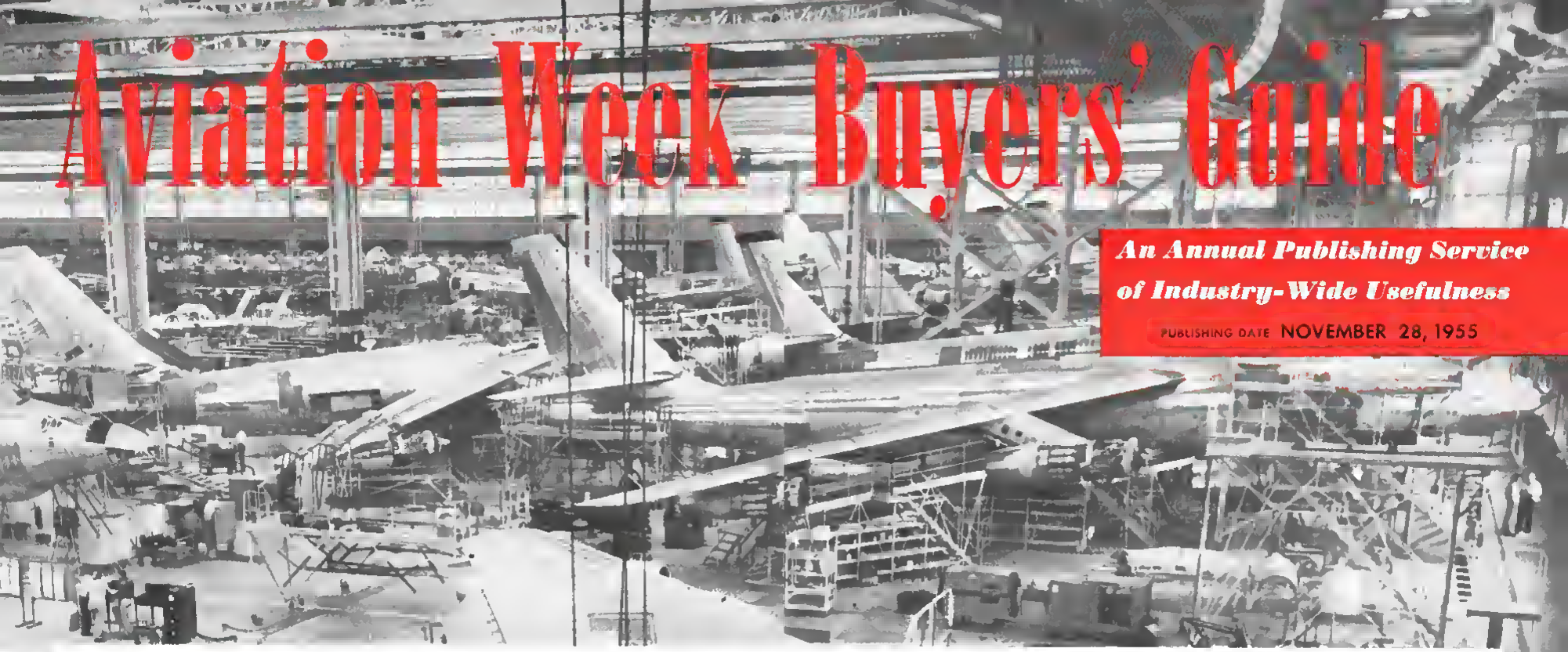


Aviation Week Buyers' Guide



An Annual Publishing Service of Industry-Wide Usefulness

PUBLISHING DATE **NOVEMBER 28, 1955**

- **INDUSTRY-DEEP** Penetration Through Aviation Publishing's Largest Circulation
- **KEY** to the Major Buying Influences in the Multi-Billion Dollar Aviation Market

November 28, 1955, an all-important, needed publishing service will be available to the aviation industry . . . AVIATION WEEK's Annual BUYERS' GUIDE. The dramatic development of aviation into today's multi-billion dollar giant—reaching into all phases of manufacturing—demanding a constant flow of products and materials from tens of thousands of separate suppliers—has made a comprehensive, complete source book of suppliers and manufacturers a must for all segments of the Industry. AVIATION WEEK's BUYERS' GUIDE answers this intelligence need with an information service of year-'round usefulness, placed directly into the hands of some *57,000 key aviation engineers, management men, design and purchasing personnel—men who make up aviation's real buying influences in the industry itself, in the Air Force, and throughout the Government.

The latest developments in military procurement will be covered in a special report. Included in the detailed information to be presented will be: Air Material Command—Air Research and Development Command buying practices, personnel listings—by name, procurement centers, etc; All-inclusive listings of manufacturers of aeronautical and allied products, sectionalized for maximum utility under six major headings: **Aircraft;** Airframe and components, Armament, Fixed Equipment, Landing Gear, Powerplant. **Missiles;** Airframe and components, Equipment, including ground-handling, Powerplant. **Avionics;** Communications systems and equipment, Radar-fire control systems and equipment, Instrumentation and controls, Navigation systems and equipment, Components and devices, Test equipment, Computers and data processing equipment in airborne, ground based or shipboard applications. **Supporting Groups;** Data systems, Electrical, Ground equipment, Hardware, Hydraulics, Instrumentation, Materials—including fuels, plastics, and chemicals, Tooling. **Nuclear Power Systems;** Accessories and components, Design services, Reactor fabrication. **Airlines and Airports;** Scheduled carriers, Non-scheduled carriers, Cargo carriers, Ground equipment, Lighting.

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* Average net paid circulation, 51,893 (June, 1955 ABC Statement). Paid circulation of current weekly issues more than 53,000. Current weekly print order exceeds 57,000.

AVIATION WEEK

A McGRAW-HILL PUBLICATION

spare parts maintenance tools and test equipment, $3,334,727.

General Electric Co. Johnson City N Y fire control system spare components and spare parts for B-47 aircraft $314,672, facilities for radar maintenance and repair $123,978.

Weston Electrical Instrument Corp., Newark N J indicator $881,403.

Eclipse-Pioneer Division Bendix Aviation Corp Teterboro N J control roll and pitch 134 ea $170,168.

Minneapolis-Honeywell Regulator Co., Minneapolis components of autopilot $1,482,578 fire control supplies spare parts special tools and test equipment and data $2,647,981.

General Mills Inc. Mechanical Division Minneapolis spare parts for Y-4 bombsight $102,000.

Eastman Kodak Co. Rochester, N Y spare parts used on Y-3 bombsight $106,000.

Piasecki Helicopter Corp. Morton Pa spare parts for 90 H-21C helicopters $8 million.

Bell Aircraft Corp. Helicopter Division Fort Worth, Tex helicopters H-13H 21 ea spares special tools ground handling equipment and data $442,082.

Convair Division General Dynamics Corp San Diego pre-production expenditures for F-102B airplane program $5 million.

Raytheon Mfg Co. Waltham Mass. transmitting set 400 ea transmitter group 200 ea transmitter group 134 ea $4,182,180.

Canadian Commercial Corp. Washington D C aircraft L-20A 21 ea spare parts special tools $711,534.

Crosley Division Avco Mfg Corp Cincinnati radio receivers mountings spare parts special tools and data $1,101,931.

Hallicrafters Co. Chicago transmitter radio 129 ea., transmitter radio 108 ea power supply 182 ea. $2,902,284.

Cessna Aircraft Co. Wichita Kans aircraft L-19A 100 ea spare parts special tools ground handling equipment $438,992.

Trad Television Corp. Asbury Park, N J adapters, spare parts and data $421,714.

Collins Radio Co. Cedar Rapids Iowa radio set $2,184,604.

Polytechnic Institute of Brooklyn 99 Livingston St. Brooklyn 1 N Y investigation of favorable 3 dimensional interference effects in supersonic flow (AF 18(600)-894) $129,000.

Regents of the University of Wisconsin Madison 6 Wis. research lattice imperfections in crystals (AF 18(600)-898) $25,230.

Trustees of Princeton University Princeton N J research oxidation of metals and alloys (AF 18(600)-927) $63,558.

Carnegie Institute of Technology Pittsburgh 13 continuation of research on conformal and variation methods (AF 18(600)-1138) $26,948.

University of Utah Salt Lake City 1 continuation and extension of high velocity impact studies (AF 18(600)-1217) $75,000.

Northwestern University 619 Clark Street Evanston Ill., investigation of phase transformations and other structural changes by measurement of elasticity and internal friction (AF 18(600)-1408 $31,112.

Polytechnic Institute of Brooklyn 99 Livingston St , Brooklyn 1 N Y research electromagnetic theory and information processes (AF 18(600)-1505) $80,005.

Trustees of Princeton University Princeton N J research on combustion processes in rocket motors (AF 18(600)-1527) $36,123.

University of Rochester Rochester N Y photochemical studies (AF 18(600)-1528) $81,515.

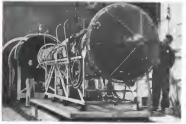
Rand Corp. Santa Monica Calif study of intercontinental warfare other than surface (AF 33(038) 6413) $1,800,000.

North American Aviation Inc. International Airport Los Angeles utility-command aircraft study (IFB AF 18(600)-1501) $84,186.

Beech Aircraft Corp. Wichita 1 utility-command aircraft study (IFB AF 18(600) 1411) $47,910.52.

University of Maryland College Park Md study of phenomena surrounding highspeed flight (IFB AF 18(600) 993) $72,000.

Fairchild Aircraft Div. Fairchild Engine & Airplane Corp Hagerstown Md utility-command aircraft study (IFB AF 18(600) 1515) $58,469.65.



Ryan Tests Avon for XF-109

Rolls-Royce Avon jet engine in new $175,000 Ryan Aeronautical test cell shows powerplant which will be used in Ryan's XF-109, new USAF vertical jet takeoff plane. Although company officials will make no comment, Aviation Week has learned that the Rolls-Royce engine fitted with afterburner will power the XF-109, which is now at Edwards AFB for flight tests (AW Aug. 22, p. 7). The cell is the nation's first facility for testing turbojets in both horizontal and vertical attitudes. It also has been used in metallurgical research for high-temperature components of all kinds of powerplants for aircraft and missiles.

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Navy Contracts

Contracts recently announced by the Navy's Aviation Supply Office, are

U. S. Gauge Div American Machine and Metals Inc Clymer Ave Sellersville Pa transmitters 1 487 ea $94 488

Bendix Products Div Bendix Aviation Corp South Bend Ind assys $30 720 carburetors $264 898

Cleveland Pneumatic Tool Co., 3781 E 77th St Cleveland strut assys 13 ea $42 327; oleo struts and parts $12 783

Holley Carburetor Co, 11955 E. Nine Mile Rd Van Dyke Mich. maintenance parts $82 204 maintenance parts for J48 engines $169 792

Red Bank Div. Bendix Aviation Corp. Eatontown N J. generators $420 411

Alina Paint and Varnish Co Inc 80 Bullington Ave Irvington N J. enamel $298 284

Hub Paint and Varnish Co Inc 47-36 Fifth St Long Island City N Y enamel, $274,087

Fairchild Engine & Airplane Corp., Farmingdale Long Island N Y tools 8 ea $29 722

General Electric Co. 1400 Locust St. Philadelphia 2 Pa brush rotor and shunt used on various generators, $83 838

Bovin Aircraft Products Inc 1191-5 Spofford Ave., New York 59, N. Y., belt assys, 6 082 ea $37 660

Jackson and Moreland 688 Park Sq Bldg Boston 16 Mass. handbooks, $41 188

Frevo Paint Co., 6024 Stanford Ave Los Angeles Calif enamel 21 000 gal $46 878

Columbian Rope Co 805 Genesee St, Auburn N. Y. wadding bound hair, $20,-093

Westinghouse Electric Corp. 3001 Walnut St. Philadelphia Pa. services 26 ea. $298 180

General Laboratory Associates, Inc 17 E Railroad St Norwich N Y ignition units and compositor assys $88,828

Breeze Corps Inc 700 Liberty Ave. Union N J ignition harnesses $48 288

Goodyear Tire and Rubber Co, 1144 E Market St Akron 16 Ohio wheel assys. 122 ea. $31 816

Purolator Products Inc, 970 New Brunswick Ave Rahway N J., element and filter assys $34 498

Scintilla Div Bendix Aviation Corp Sherman Ave Sidney N Y coils 358 ea $28 200

Benjamin Franklin Paint and Varnish Co, 4828 Langdon St Philadelphia Pa. enamel 18 000 gal $42 688

AiResearch Mfg Co 8851 8951 Sepulveda Blvd Los Angeles, maintenance parts used on gas turbine compressors and power units $26 577

Glenn L. Martin Co Baltimore 3 maintenance parts used for P5M spares $36 825

Eclipse-Pioneer Div Bendix Aviation Corp, Teterboro N J testers 34 ea., $94-690

Airheart Products Inc, 2582 Cherry St. Long Beach Calif cable brake releases 13 000 ea $157 850

Ace Engineering and Machine Co Inc 3644 North Lawrence St Philadelphia Pa electromagnetic shielded enclosures, 125 ea., $159 400

General Electric Co West Lynn, Mass., generators 28 ea. 25 ea control panels, 69 ea., $112 481

BuAer Contracts

The following contract awards of $25 000 and more have been announced recently by the Bureau of Aeronautics, Department of the Navy, Washington 25, D C

Kollsman Instrument Corp 80-08 45th Ave. Elmhurst 73 N Y tachometer indicators and spare parts NOAs 55-653 f (PD-42-3011 55) 910 ea $48 982

Hewlett Packard Co., 395 Page Mill Rd Palo Alto Calif signal generators NOAs 55-940 f (EL 42 1218 55) 10 ea $30 867

AiResearch Mfg Co. 8851 8951 Sepulveda Blvd Los Angeles auxiliary power units and spare parts, NOAs 55-642-r (PD-43-5087-55) 123 ea $3,288,443.

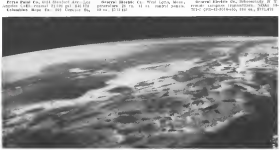
Hazeltine Electronics Corp, 58-25 Little Neck Parkway Little Neck 62 L. I. N Y listening sonobuoys, NOAs 55-734 f (EL 46-1736 55) 7 380 ea $1 065 800

Magnavox Co 2131 Bueter Rd Fort Wayne Ind. listening sonobuoys NOAs 55 735-f (EL-46-1339 55), 11 380 ea., $1 471,-828

Sparks Withington Co, Sparton Radio-Television Div, Jackson Mich listening sonobuoys NOAs 55 736 f (EL-46-1337-55), 8 500 ea. $1 177 836

Sanders Associates, Inc, 137 Canal St Nashua N H., listening sonobuoys, NOAs 55-737 f (EL 46 1262 55) 7 432 ea., $1 162-483

General Electric Co., Schenectady N Y remote compass transmitters NOAs 55-787-f (PD-42-3014-55), 884 ea., $121,472



Viking Camera and the Far West

Camera in Viking 12 (at right) snapped picture (above) from 143 4 miles up, catching part of northern Mexico, the Gulf of California and Lower California (shown jutting out of the picture in upper left). Moving to the right in the picture from the Gulf of Mexico are the Laguna Salada and the Salton Sea The lower right hand corner shows the Phoenix, Arizona, area and Lake Roosevelt The shutter of the K 25 camera was snapped just as the Navy rocket began its descent from its peak altitude of 143 5 miles during a test run for the Naval Research Laboratory's upper atmosphere research program The picture, recorded on infrared film, was taken on Feb. 4, but was released for publication only this month by the Department of Defense in Washington The Naval Research Laboratory, with headquarters in Washington, has been conducting its upper atmosphere research program with rockets for the government since 1946 The Viking is the largest single-stage American rocket designed and built specifically as an upper-atmosphere research vehicle.

New Stock Changes Reported by SEC

The following recent exchanges of aviation stock were reported by the Securities and Exchange Commission in a summary of security transactions:

• **Seaboard & Western Airlines Inc.** Disposal of 500 common shares by Carl D. Brell, officer, leaving a holding of 26,525; acquisition of 300 common shares by Harold Montee, officer, making a holding of 10,975; disposal of 1,000 common shares by Arthur V. Norden, officer and director, leaving a holding of 24,871; disposal of 2,000 common shares by Raymond A. Norden, officer and director, leaving a holding of 25,337; disposal of 500 common shares by Charles B. Ripley, director, leaving a holding of 25,000.

• **Solar Aircraft Co.** Disposal of 300 common shares by Herbert F. Sturdy, officer and director, his total holding.

• **Sperry Corp.** Disposal of 700 common shares by Thomas E. Doe, director, leaving a holding of 1,055; disposal of 2,000 common shares by Charles M. Green, officer, leaving a holding of 400; disposal through exchange or conversion of 8,100 common shares by I. J. Harvey, Jr., director, his total holding; disposal of 1,575 common shares by K. R. Herman, officer, his total holding; disposal of 1,820 common shares by Berl T. Oakley, officer, his total holding; disposal of 900 common shares by Charles Ondrick, officer, leaving a holding of 500; disposal of 10,102 common shares by John Sanderson, officer and director, his total holding; disposal of 32,740 common shares through exchange of conversion by Harry F. Vickers, officer and director, his total holding.

• **Trans World Airlines Inc.** Disposal of 500 common shares by John A. Collings, officer and director, leaving a holding of 1,760.

• **United Air Lines Inc.** Disposal of 100 shares of 4¼ pc. cumulative preferred by Eric A. Johnston, director, leaving no holding; acquisition of 1,200 shares by class A common by Eric A. Johnston, director, making a holding of 2,000.

• **United Aircraft Products.** Acquisition of 500 common shares by Harry Harris, director, making a holding of 1,501; acquisition of 500 common shares by Lester Sapiher, director, making a holding of 1,040.

• **Westinghouse Electric Corp.** Acquisition of 500 common shares by John M. McKibbin, officer, making a holding of 3,520.

Cell Mates Rejuvenated

Compact bench-size battery rejuvenator used at Northrop Aircraft, Inc.'s Hawthorne plant, extends life of flashlight batteries by 400%. Unit holds 184 batteries, charges them in two hours. The salvage operation paid for the cost of the charger in 45 days, says Northrop, which uses about 13,000 batteries a month at Hawthorne. Majors Aircraft Engineering Co., Hawthorne, Calif., manufacturers the equipment.

Electronic Aids Speed Quality Control

By J. M. Thompson and S. Maszy*

The quality requirements for materials that will be used in high performance aircraft of the future make non-destructive testing imperative. But test techniques must be accurate, efficient and easy to use.

For these reasons electronic instruments are playing an increasingly important part in quality control. At Convair-Ft. Worth their use has not only reduced the man hours required but has also improved the quality of work produced.

The processes and materials used in the fabrication of aircraft are costly because of the precise workmanship, close tolerances and high grade materials required.

Verifying the quality of parts is expensive if representative parts must be destroyed to determine the quality of a number of identical items, or if an entire assembly must be disassembled and reassembled to check components.

Prior to World War II, material and labor were cheaper; therefore, extensive mechanical testing was not objectionable. Today, materials and labor are at a premium, and costs must be reduced by eliminating expensive methods of inspection and quality control by substituting improved methods.

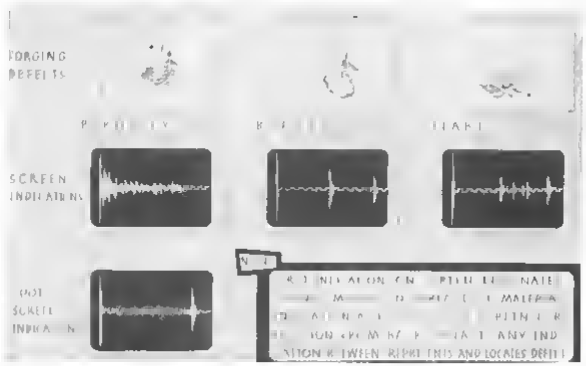


CHART above is used by Reflectoscope operator at Convair-Fort Worth. On the Reflectoscope, porosity appears as "hash," bursts as single pips and flakes as multiple pips.

Properties and Defects

Electronic instruments have been perfected to such a degree that the internal structures and composition of parts and material can be easily determined.

There are electronic instruments that can check material as to heat treatment hardness, type of metal and alloy as well as presence and size of internal defects (such as cracks and holes).

Other types of electronic instruments give fast and accurate determinations of various elements contained in solids and liquids.

Still other electrical equipment, using the color spectrum, can be employed to determine various components of different materials.

Electronic instruments also reduce human error to a minimum. The accuracy of such instruments is generally higher than that of most mechanical types of testing equipment.

The types of electronic instruments being used at Convair-Fort Worth are divided into two classes:

- **Inspection department tools** to verify the quality of the product and the conformance of a particular part to a specific drawing.
- **Laboratory instruments** used by trained personnel to evaluate material requirements with respect to government and other specifications not directly related to dimensional properties.

Many inspection functions may be accomplished by visual examination where the quality of the product depends upon its appearance or other visible characteristics. Some surfaces must be checked by an instrument to assure the correct finish. This is a "physical" type of inspection and is done by the inspection department at Convair-Fort Worth.

The "physical" inspection of aircraft parts has been improved by electronic instruments such as the Reflectoscope, Sonizon, Audigauge, Fluoroscope, and Magnaflux.

The chemical characteristics or composition of the parts are determined by the process control laboratory using the Spectograph, Quantometer, Spectrophotometer and X-ray.

Reflectoscope

The Reflectoscope is a non-destructive instrument for locating internal defects in metals and other materials. It employs ultrasonic vibrations which are transmitted and received through a thin quartz crystal. The Reflectoscope produces a visual indication which enables the operator to instantly and accurately locate large and small defects in the part (see sketch above).

Standard test blocks having defects of known size and location are used to regulate and adjust the Reflectoscope. It is portable but requires a source of 110 v a.c. power.

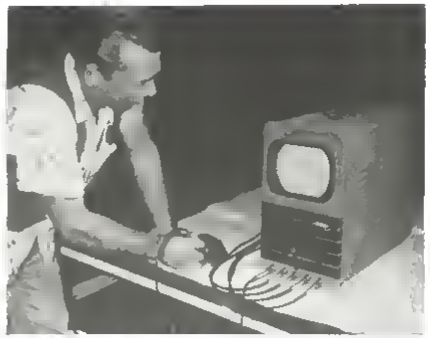
Parts which have irregular shapes and rough surfaces can be scanned ultrasonically for internal defects by submerging them in water. The scope is mounted on a traveling platform (see photo, p. 59) which can be moved in any direction in order to inspect all areas of the part. A hood attachment cuts glare caused by outside light.

Sonizon

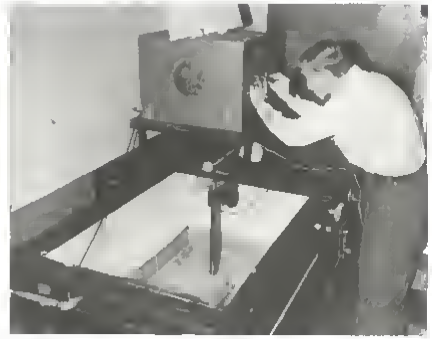
Another instrument, the Sonizon, is essentially an electronic micrometer which can be used to measure the thickness of material or the depth of an internal flaw. The device employs a hand probe containing a quartz crystal which is placed on the material to be inspected. The crystal is fed a constantly changing high-frequency impulse which is converted to ultrasonic waves that travel to the opposite face of the material and are reflected back to the crystal.

When the "echo" sound waves arrive as the next waves are leaving the crystal, an energy change occurs in the electronic circuits. The energy is amplified, causing a peak to occur on the cathode ray tube. The location of the peak on

*The authors are employed at Convair-Ft. Worth where Mr. Thompson is a research metallurgist and Mr. Maszy is a senior metallurgist.

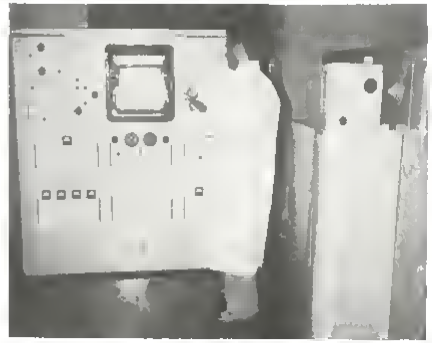


SONIZON, shown above with scale calibrated in inches, measures the thickness of a part



ONE METHOD of ultrasonic inspection is by under water scanning Scope can be moved in any direction

BECKMAN MODEL OU Quartz Photoelectric Spectrophotometer used to identify types of chemical solutions.



QUANTOMETER can check materials for chemical composition at a rate of one every 10 seconds or less.

a calibrated scale gives a direct reading of the thickness of the material or, in the case of a defect, the depth of the defect The instrument is accurate to within 2% for either thickness or depth measurements

The Sonizon has been used for many types of inspection that formerly required the destruction of parts such as engine cylinder walls fuel tanks, and propeller blades

Audigauge

The Audigauge provides a non-destructive, rapid and accurate means of inspecting "blind wall" thickness of aircraft skins, tanks and pipe when only one side is accessible This inspection method eliminates special tools, costly shut-downs and destructive drilling and plugging inspection methods

It can be used on such different materials as copper, aluminum, nickel, steel, glass and plastics However, wood, concrete or any porous material cannot be tested Cast materials may be measured with the Audigauge but with more difficulty because of the internal damping effect Convair-Fort Worth has used the Audigauge to locate laminar flaws and to determine the effectiveness of the bond between materials

Measurement is made by placing a vibrating quartz crystal in contact with one side of the material under test so that an ultrasonic wave is transmitted into the material This wave travels in a narrow beam through the material and is reflected by the opposite surface

These harmonic signals are located by moving a calibrated dial The signals are indicated automatically through earphones to the operator and also on a calibrated dial

At certain frequencies, when the transmitted and reflected waves are in phase, there will be a relatively large increase in the amplitude of the wave in the material This is a resonance condition occurring at a fundamental frequency which is inversely proportional to the velocity of the sound in the material Since the velocity of sound is a known constant, the determination of the fundamental frequency required to produce resonance is an accurate and reliable measure of an unknown thickness

For the Audigauge to be effective, all surfaces of the parts to be inspected must be smooth enough so that a thin film of oil, grease or glycerine may be used as a coupling between the crystal and the part Thin layers of mill scale, plating, enamel or hard paint have little or no effect on the accuracy of the Audigauge Curved surfaces must have suitable crystals to compensate for the curvature The Audigauge is a portable, self-contained instrument.

Magnetic Inspection

Magnetic particle inspection, in which a magnetic field is set up in the proper direction within the part, is one of the most widely used electronic inspection techniques, although only ferromagnetic materials can be checked by such Magnaflux equipment

Interruptions in the magnetic field, such as cracks, discontinuities and in-

chasms, tend to crowd some of the magnetic flux (line of force) outside the surface of the part. These types of leakage fields act as local magnets and attract and hold the finely divided ferromagnetic particles as they are applied. A definite indication is built up in this area showing the extent and shape of the discontinuity.

The magnetic particles may be applied manually or automatically, either as a dry powder or by suspension in a thin oil carrier. Various colors of powder may be used to make the indications stand out clearly on colored surfaces.

The majority of ferromagnetic aircraft parts are 100% inspected by the magnetic particle method for defects, flaws or cracks. This method of inspection, especially for cracks and inclusions, is almost foolproof and is the most accepted method of inspection in the aircraft industry.

The Magnaglo process of magnetic particle inspection is identical to the Magnaflux wet process except that the magnetic particles glow under ultraviolet light. The examination therefore must take place in a dark room and under black-light conditions. In this manner, indications that normally would not be seen by the naked eye become more pronounced.

X-Ray

The X-ray machine is a non-destructive testing instrument which uses the penetrating power of X-rays to determine internal defects in raw or finished products.

The X-rays are projected through an object onto a photographic film. The internal construction and the variation in thickness are shown in the exposed film, thus analyzing the entire composition or plane surface. Any variations in a section, such as inclusions, porosity or voids, will show up as a contrast in the film either as light or dark areas or as spots which can be spotted by an experienced operator.

This method is used extensively in foundry control of castings. Defective techniques in pouring castings can be eliminated before production castings are made. The incorrect placing of risers can be spotted and other faulty procedures can be found on test castings. This approach is economical because it prevents foundries from producing defective castings.

X-ray also is used to show whether the internal mechanisms of certain assemblies were properly put together.

Fluoroscope

Fluoroscopic inspection is identical in principle to X-ray examination except the "shadow picture" is reproduced on a fluorescent screen instead of on a photographic plate.

This method of parts examination is instantaneous but limited to thin sections of steel and progressively heavier sections of nonferrous alloys, depending on the degree of X-ray penetration through any particular alloy.

Chemical Analysis

Spectrochemical analysis is a fast, accurate and convenient method of chemically analyzing metallic alloys. It identifies the detectable chemical elements of inorganic compounds by their wave length characteristics. (The light given off by an element identifies it in the same manner as finger prints identify a human being.)

An unknown material may be identified by a particular element or elements. However, to test a known material to a particular composition specification requires the determination of all elements and the intensities of their respective spectrum in the sample.

The sample to be analyzed is prepared and mounted in the excitation stand. The specimen then is excited (made to emit light) by an electric spark. The wave lengths of the light emitted are sorted out by gratings and recorded on a photographic plate as spectrum lines. The lines are arranged according to their wave-length value on the film and are identified with the aid of charts and tables.

No two elements have the same spectrum, therefore the presence of a particular element is readily detectable. The intensity of the wave length emitted by the element under controlled excitation conditions is a function of the concentration of that element.

Densitometer

By means of the Densitometer the intensity of the particular spectral line can be calculated into percentage of element present. The results of spectrographic analysis may be obtained in a few minutes as compared to wet chemical analysis which usually takes several hours. Another advantage is that a tiny sample, only a milligram or less in size, obtained from the products of corrosion can be used. The same size sample would be too small for wet analysis.

Many elements are present in materials in such small quantities that without spectroscopic methods of analysis their presence or amounts could not be determined.

Quantometer

The Quantometer (see photo, p. 59) is a highly refined and improved Spectrograph which eliminates the necessity of developing a negative and interpreting results on a Densitometer by accomplishing these functions electronically.

Parts that must be tested for chemical composition can be checked by this means at a rate of one every 10 seconds

in less so the instrument could be used in an assembly line if required. The article is set up for test in exactly the same way as for the Spectrograph, using the same multisource.

The light from the grating passes through pre-selected secondary slits on to mirrors that deflect the light onto photo multiplier tubes. These are calibrated for pre-selected channels for each element and the Quantimeter records the amount of all elements individually in one excitation. The integrated output of the photo multiplier tubes is multiplied and recorded to show the intensity of the spectral line.

By proper standardization of the instrument the recorder response will indicate the percent concentration in each for each element. Upon completion of the cycle, the instrument is automatically reset and ready for another analysis.

Spectrophotometers

The infrared Spectrophotometer is an electronic device used primarily for qualitative and quantitative measurements of various constituents in organic materials. Infrared absorption spectra can be used for the identification of pure substances or for the detection and identification of impurities.

There are more applications in the organic field than in the inorganic field primarily because water, the chief solvent for inorganic compounds absorbs strongly beyond the infrared spectrum of about 1.5 microns.

For the identification of substances in the pure state it is necessary only to compare the spectrum of the unknown with the spectra of the various possible substances. Usually enough is known about the origin or the nature of the unknown substance so that a limited number of possible substances will be suggested to the analyst. When a match between spectra is obtained identification is complete.

Oils, greases, solvents, etc., are tested quickly and the results plotted on an automatic recorder.

This graph is compared with the graph of a standard known sample, and the analysis is made.

The Beckman Model DU Quartz Photoelectric Spectrophotometer (see photo, p. 59) is an instrument with a wide spectral range for use in the identification and determination of all types of chemical substances. It is used in applications demanding accuracy and dependability with great versatility and ease of operation.

The instrument permits measurements in the wavelength range from 320 to 1,000 millimicrons—with the ultraviolet accessory attachment measurements down to 220 millimicrons are possible.

In operation, the light from a lamp is focused on an adjustable slit by mirrors. The light rays strike the collimating mirror and are reflected toward the prism. The monochromatic light then passes through the absorption cell into the photo tube, where it is amplified and measured directly as percentage of transmitted light. This method of analysis is known as absorption spectral determination.

For many substances infrared or ultraviolet radiation sources are required. The flame Spectrophotometer for example utilizes a flame instead of a lamp as a light source. The sample in liquid form is atomized into the flame which in turn excites the elements in the sample, causing them to emit radiations of various wave lengths. The measurements of these emissions identify and determine the amounts of the elements.

Small Rectifier

Pea-size silicon rectifier developed by Bell Telephone Labs, has current-handling capacity equivalent to the seven large selenium rectifiers in the background and an efficiency greater than 98%. Bell says. New device is expected to have almost unlimited life at temperatures up to 400°F.

FILTER CENTER

► **R-W Narrows Site Location**—Choice of sites for the Ramo-Wooldridge Corp's new manufacturing facility, the company's first, has been narrowed down to three areas: Denver, Dallas-Ft. Worth and Albuquerque. Facility will manufacture both military and commercial computer-automation systems developed within the company.

► **New Short Pulse Radar**—A new small lightweight X-band radar, employing a pulse only 0.02 microseconds long which makes possible target range definition to 10 feet or better, has been developed by Litton Industries. The new radar appears particularly attractive for application to low-altitude radar altimeters, flare-out path adaptors, aircraft station-keeping problems and missile firing error detectors. A radar altimeter employing the new techniques reportedly would weigh only 19 lb. and occupy 0.33 cu. ft.

LETTERS

Aviation Week welcomes the opinion of its readers on the issues raised in the magazine's editorial columns. Address letters to the Editor, Aviation Week, 330 W. 42 St., New York 36, N. Y. Try to keep letters under 500 words and give a genuine identification. We will not print anonymous letters, but names of writers will be withheld on request.

Nonskeds Defended

Reading your editorial of July 25, 1955 I became disturbed over one paragraph which reads

> North American was interested only in the high density traffic routes where by price cutting it could skim some of the cream from the existing air transport market. It had no responsibility to serve less profitable points that are part of the "public convenience" a responsibility shouldered by certificated airlines.

These words implied to me that you were swallowing a "cream" argument without much consideration of the merits of the argument. The non-scheduled airlines are accused of neglecting the short hauls in favor of the more profitable long hauls. But, as I pointed out at a recent oral argument before the Civil Aeronautics Board this concentration on long hauls, with the consequent reduction in long haul fares especially for the many passengers with moderate incomes, was and is one of the greatest contributions to civil aviation made by the non-scheduled carriers.

The most important passenger of the airline is the traveller who has to go a long distance in a short time. The Washingtonian who wants, or needs to get to California—or to Florida—is a more promising and dependable air passenger than the Washingtonian who flies to Philadelphia.

Before the independent carriers initiated coach services, the trunk airlines were charging the long haul passenger more per mile than the short haul passenger. Yet as you know, it costs an airline less per mile to transport the long haul than the short haul passenger. The trunk airlines were, therefore, overcharging the long haul passenger in order to subsidize their short haul passengers. A correction of an uneconomic maladjustment in the fare structure is scarcely "cream skimming."

The airline industry's development can be best effected by catering to, rather than penalizing, its best customers. The trunk airlines apparently blame the non-scheduled carriers for not being the kind of merchandisers who try to sell the customer something for which he has relatively little need. And they criticize the non-scheduled carriers because they have succeeded in giving travellers with moderate incomes something they much need and are not yet adequately furnished.

It is argued by some that income from the fat routes is necessary to defray losses incurred on the lean routes. This is just another way of saying that the trunklines

earn fat profits on the long haul passenger in order to carry the short haul passenger on a lean margin in competition with railroads and buses. "Lean" routes are not necessarily "loss" routes. No doubt there are some cities on trunkline routes which may not yet be profitable. Such cities are in large number being turned over to local service airlines (over the protests of the cities too). If there are loss cities where air transport must be provided that service should be subsidized. Whatever subsidy is allowed, however, should be clearly and cleanly stated and not mixed up with "fat," "lean" and "cream skimming" arguments.

I have written at some length because it seemed that you have not considered the foregoing factors. In the *Large Irregular Investigation* (C.A.B. Docket No. 5132) numerous tables supporting the facts set out above were received in evidence.

ALBERT F. BEITEL
Morris, Pearce, Gardner & Pratt
American Security Building
Washington 5, D. C.

(Mr. Beitel represented the Air Coach Transport Association, of which North American Airlines is a member, in the Large Irregular Carrier Investigation by the Civil Aeronautics Board.—Ed.)

Red Plane Photos

Congratulations on your editorials, particularly those on censoring of photos of recent Russian aircraft.

We of the Capt. McConnell Post, CGC, at Dover, N. H., have done all we could with photos and clippings from your magazine to make up posters and placing them on display at nearby store windows, to better reach the public.

I believe if the public was more fully aware of how vulnerable we are from the air, our job recruiting volunteers for the CGC wouldn't be half so bad.

We sincerely hope you keep up the good work on putting information about the Red air force.

GILBERT V. DOLLOFF
232 High St.
Somersworth, N. H.

High-Density Revisions

You state in your July 18 edition (p. 23) in respect to the establishment of a High-Density Area Traffic Zone at Washington, D. C. "... the CAA has decided to go ahead with the plan."

It is true, as you state, that the project was held up by the Aircraft Owners and Pilots Association, whom I had the privilege of representing at the public hearing.

I think it is important for the many thousands of supporters of the Association to know that the plan that the CAA is going ahead with resembles the original plan just about the way the successful Sikorsky helicopter resembled Leonardo's theoretical sketches of his dreams along that line.

You mention "... the CAA has exempted certain limited areas south of Washington ... " to meet the needs of light plane operators. There were several additional differences between the CAA's original proposal and the plan it is now going to try.

experimentally for the 116 day period, Aug 1st to Nov. 24th.

In the first place, the prior experimental period as we understand it was to have been a year, and the reduction of this to approximately 4 months is in itself helpful to aviation in the Washington Area should the plan prove dangerous or unduly burdensome.

Secondly, the original plan proposed to forbid the entry into the zone of any VFR traffic if it were not destined to or departing from an airport within the air space. This has now been dropped from the plan and thus probably its most onerous and useless feature has been removed.

Next, it was proposed that the tower operator at his discretion might close the Washington Zone to any VFR traffic despite the existence of VFR conditions. This also has been removed from the plan.

Indeed remaining in the plan are only two of the original proposals. Firstly, that traffic within the Zone maintain constant two-way radio liaison, and secondly, that it remain under 150 miles an hour airspeed.

It would be untrue to say that in theory AOPA is not opposed to the additional zone, but as a practical matter, inasmuch as the most unacceptable portions of the proposal have been removed a refusal to cooperate with the Administrator now in this watered down proposal might be classified as "nit picking."

Albert L. Wolf
Wolf Block Schorr & Solis-Cohen
12th Fl. Packard Bldg.
Philadelphia 2, Pa.

Rx for Congestion

Your editorial on the Air Traffic Control Problem in your Aug. 6 issue does not mention what is quite possibly the most promising solution of the airport congestion problem. This is the convertiplane.

Possibly you are not aware of the fact as particularly pointed up in NACA technical Note 3304 that with the advent of the turboprop engine it becomes possible to produce transports of over 350 mph that are capable of vertical take off and landing without material impairment of speed, range or load capacity.

The development and certification of such aircraft is of course a process involving considerable time and then use as a solution of the airport problem must therefore be considered a long range one. However the solution when attained is such a satisfactory one and the benefits to air transportation so great in other ways that acceleration of convertiplane development should enlist it would seem the active efforts of all interested in the future of aviation.

Haviland H. Platt M.E.
Engineering Consultant
19 East 53rd St.
New York 22, N.Y.

(AVIATION WEEK follows convertiplane as well as all other new aviation developments closely. An analysis of the VTOL transport model test flown by NACA scientists as part of their research into vertical rising aircraft appeared in our June 13 issue.—ED.)

First Royal Gull Executive Plane Ready to Make Market Debut

Milwaukee—The first Royal Gull, only twin-engine amphibian now in production in the U. S., is being completed here after a $300,000 six-month long redesigning period.

The first of the Italian built five seaters, which have a retail list price of $74,500, f.a.f. Mitchell Field, Milwaukee, already has been sold to the West Aircraft and Finance Co. of Denver, its distributor in 11 Western States, Alaska and Mexico.

The Gull's components, built by Piaggio & Co., Genoa, are shipped to Milwaukee for assembly and installation of American engines, propellers, radio, instruments and accessories. Royal, however, has reserved the right to manufacture the entire plane in the U. S. if it becomes impractical to obtain the components from Italy. Current schedule calls for completion of two Gulls a month.

Recent changes in the aircraft's design, requested by Royal for its American market, include:

- A second step in the after hull to facilitate dead calm water takeoffs.
- Enlarged fin and rudder area and increase of rudder throw 10 deg. each way for better single-engine flight characteristics.
- Movement of hydraulic system oil and air connections from cockpit to left wheel well for greater accessibility.
- Relocation of exhaust stacks to nacelle side to reduce cabin noise and keep cold water from spraying hot stacks when in operation.
- Improved insulation to lessen engine noise transmitted through main wing spar.

Performance Features

Tubing in the Gull will use standard AN fittings and all but the main wing and landing gear attach bolts will be changed over to AN nuts and bolts.

Other design and performance features:

- Engine cooling. On a demonstration flight with Wallace P. Watson, Royal's chief pilot, cylinder head temperatures stayed within limits at all times. Ambient temperature was 90[illegible].
- Water maneuverability. Rudder is mechanically retractable for better water handling. The plane can be kept under complete control with one engine inoperative.
- Proportional wing flap hydraulic control. Cockpit handle moves flaps to quarter, half, full down or intermediate settings. Flaps move at the same speed as the control handle.
- Hand-operated built-on bilge pump. Any of the plane's four watertight hull compartments can be drained of accumulated water.
- Italian hydraulic brakes. Effective wet or dry, they do not chatter when wet, the maker reports. Wheel bearings are sealed to keep out water and sand.
- Wide engine cowling opening above and below the wing facilitates change of cylinders or accessories.
- Right windshield is hinged along centerpost. Co-pilot can swing plastic closure open for access to anchor stowage compartment and pilot can help in the docking and mooring of the plane.
- Forward hull intake vents and after fuselage exhaust vents keep explosive gas fumes from accumulating in the hull.

The Gull is not a prototype aircraft. The current model P.136 L-1—with a cruising speed of 164 mph. (at 70% METO power, 8,000 ft.—is a development of a design used by the Italian Navy for over three years.

The two aircraft being used by Royal as company plane and demonstrator have a combined total of 500 flying hours. The planes have experienced three malfunctions thus far—a burned out hydraulic pump solenoid, a fuel pump drive shaft failure and a worn brake biscuit on one of the planes at 170 hours.

Standard Equipment

Standard equipment on the new executive plane includes Stewart-Warner South Wind 20,000-Btu. combustion heater, dual flight controls and brakes, windshield defrosters and Grimes "eyebrow" instrument lighting. Instruments for night and bad weather flying also are included.

Powerplants are Lycoming GO-480-B1 engines each of which develops 270 hp. on takeoff. Three-bladed constant speed propellers are full-feathering all-metal Hartzells of 84 in. diameter.

Here are the details of the Gull's operating systems:

- Hydraulic. An electrically driven Pesco 0.5 gpm., 1,500 psi. pump supplies normal hydraulic pressure. An automatic pressure switch cuts in when system pressure drops to 1,280 psi. to start the motor for pressure buildup. Accumulators for the main system and the brake system are provided.

The hydraulic system operates the main and tail landing gear retraction, wing flap control and normal and parking brakes. Main gear retracts into the side of the hull; the tail wheel rotates 180 deg.

An emergency hand pump and a separate emergency main landing gear lowering system are provided. The tail wheel is not lowered when this system is used but a skid plate at the bottom of the rear hull helps to stop the plane.

A check valve isolates the brake hydraulic system from the main system.

The brakes remain operative so long as pressure remains in brake accumulator even if the main system fluid is lost.

- Electrical. Two engine-driven 24-v. generators rated at 50-amp. normal and 100-amp. momentary overload capacities feed the system. Two 12-v. batteries, more available than 24-v. at ex-centre plane service bases, and 10-lb. lighter, are mounted in the forward hull.

All switches also serve as circuit breakers. Landing lights are mounted in the wing's leading edges.

- Heating and ventilating. A common

Cowl Aids DC-3 Speed

Cruise speed increase of at least five knots is expected for Sears, Roebuck executive DC-3 fitted with new engine cowls that have frontal area of 30 in. compared with 38 in. for standard cowls. The streamlined cowlings are also said to improve engine cooling by reducing interior turbulence. A five knot gain was experienced with the DC-3 fitted with one prototype and one production version of the cowl, which is made by Miner's Aircraft & Engine Service, Inc., 8165 First Avenue South, Seattle, Wash. New cowling has been approved by Civil Aeronautics Administration after two-week flight test.

set of ducts is controlled by a four-way valve in the cockpit.

For cooling, air is drawn through a screened intake at the base of the left wing's leading edge and forced through a combustion heater (which is off) to four individually-controlled outlets in the cockpit's baseboard. Additional cold air is ram-fed to two swiveled air outlets at each end of the instrument panel.

Combustion heater hot air can be directed to the engine through the four-way control valve for pre-heating in cold weather.

It is estimated that a 30-40 minute warm up for each engine is sufficient in all but extreme arctic conditions under this system. Hot air is blown directly onto the cylinder of the aircraft's engine.

• **Fuel.** Two 95-gal. tanks are mounted in the center fuselage on the plane's center of gravity so that longitudinal trim remains unchanged as fuel is consumed.

Two engine-driven fuel pumps feed gasoline to powerplants. Crossfeed allows one pump to serve both engines in the event that the other pump should fail.

When a fuel pump broke on one of Royal's Gulls, the company felt that the fuel pressure supplied by the remaining pump was marginal. Gulls, therefore, will be equipped with two electrically driven booster pumps to assure adequate fuel pressure under emergency conditions.

• **Vacuum.** Two engine-driven vacuum pumps supply low pressure to drive the plane's gyro instruments.

• **Cockpit.** Pilot's and co-pilot's seats are adjustable and rear seat comfortably accommodates three men. Large windshield and windows provide good visibility.

The aircraft's flight controls are of the push-pull type located on the instrument panel.

The landing gear control knob is in the shape of a wheel, wing flap control knob is patterned after an air foil for easy identification. The forward baggage compartment (behind the rear seat) has a 120-lb. capacity, the rear compartment (in aft hull) can hold 300 lb.

Francis J. Trecker, president of Kearney & Trecker Corp., which owns Royal Aircraft, already is thinking of a larger, faster amphibian if the Gull proves successful.

Both the Mexican Air Force and Navy have expressed interest in the plane during a recent demonstration of the Gull in Mexico City as part of the company's sales campaign.

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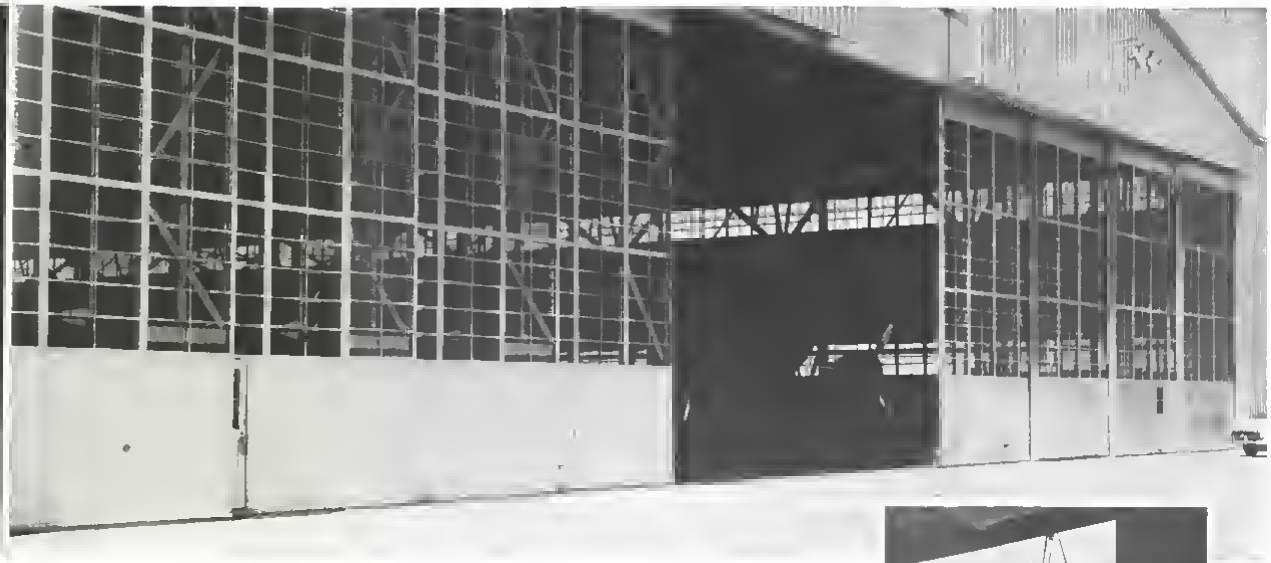

Truscon Motor Operated Straight Slide Hangar Doors
Detroit Wayne Major Airport, Detroit, Mich.
Giffels and Vallet, Inc., architects
O W Burke Co., contractor

These Straight Slide Steel Hangar Doors recently installed at Detroit Wayne Major Airport give new proof that Truscon knows how to build the big ones. Republic's Truscon Steel Division makes doors to fit every need, every size of opening. Each is the product of nearly thirty years' specialized experience in big door design and manufacture.

The success of every door installation requires just such experience. Hangar doors are no job for amateurs. Coping with the demands of these big jobs requires sound engineering knowledge, design experience, plenty of background in the field, skilled fabrication and big ideas. Truscon offers this type of seasoned thinking to you.

High, wide, quick-opening Truscon Steel Doors help get the big ships in and out fast. You choose from a variety of proved types, fitted to all airport service and climate conditions. Truscon designs include Straight Slide Doors, Vertical Lift Canopy Doors, Braced and Unbraced Canopy Doors, Tail Doors. Truscon Door engineers and field crews will help you apply the proper design and type to the job at hand. For facts, send coupon.

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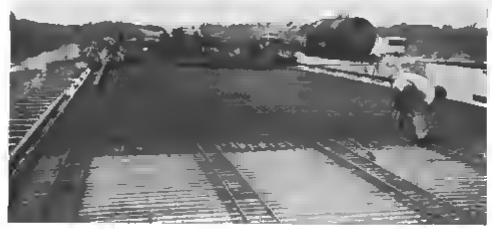
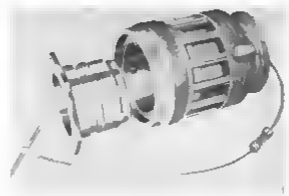
World's Widest Range of Standard Steels and Steel Products

UNITED AIRLINES GOES VISION-VENT. The new Finance and Property Building of United Airlines, Midway Airport, Chicago, is built with Truscon Vision-Vent Window Walls. Vision-Vent is a complete prefabricated window with insulated panels. It incorporates all the mass production and installation economies of standard steel windows. For airport administration buildings, passenger facilities, waiting rooms, warehouses and other service establishments, ask your architects about Truscon Vision-Vent. Send coupon for more facts.



PLANNING LONGER RUNWAYS? Be sure to specify Truscon Steel Reinforcing Bars for crack-resistant concrete construction. Truscon pioneered in the development of concrete reinforcing, now offers immediate delivery of deformed steel reinforcing bars and welded wire fabric out of warehouses located coast to coast.

NEW AVIATION PRODUCTS

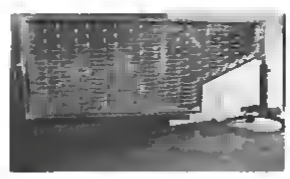


Air-Start Coupling and Hose

Air-start coupling provides two methods of disconnect: lanyard and manual. Coupling may be connected to a nipple either by rotating the collar to the lock position or by skinning the collar back as on lanyard disconnect. Air start couplings were tested satisfactorily to the following pressure requirements: operating—100 psi, 700 F; proof—175 psi, 700 F.

Hose can be run over by rubber tired vehicles without damage and can be packaged into small container units. Hose meets pressure requirements of 75 psi operating, 150 psi proof and 225 psi burst pressures. It is rated for 550 F operating temperature. Operates under all weather conditions and remains flexible at −120 F.

Roylyn Inc., Glendale, Calif.



Simulates Aerodynamic Heating

Portable radiant heat unit for aircraft structural testing is capable of producing approximately 20 deg F/sec heat rise on certain aircraft skin surfaces. It utilizes 162 quartz infrared heat lamps that consume nearly 400 kw.

Originally designed for studying a particular aircraft wing section's response to a transient heat cycle, the unit can also be used to simulate aerodynamic heating effects resulting from flight at supersonic speeds.

Cook Research Laboratories, 2700 N. Southport Ave., Chicago 14, Ill.

Ultrasonic Cleaners

Used for cleaning nuclear parts and armatures, new ultrasonic devices have stainless steel basins with diameters ranging from 4 to 12 inches.

The cleaner unit consists of cabinet which houses a generator of high power electrical energy and a transducer or cleaning unit which holds cleaning solution and converts electrical energy into high frequency sound. The device transmits specially selected sound waves which "boil up" the water detergent solution to achieve high penetration of the part to be cleaned.

Complicated mechanisms may be cleaned without disassembly.

Pioneer-Central Division, Bendix Aviation Corp., Hickory Grove Rd., Davenport, Iowa.

Multi-Purpose Light Kit

Inspection kit contains a flashlight with lock switch, two batteries and bulb, four detachable Lucite rods (two straight formed and two angled formed, 3½ and 6 in. long), and three detachable angle formed mirrors (½, ¾ and 1 in. in diameter). Magnifying mirrors are rated at 1½ power.

Lights permit close examination of inaccessible or hard-to-see areas through the expedient of bending light around corners.

F. T. S. Corp., 309 Vine St., Camden 2, N. J.

Plastic-Steel for Dies

Devcon, a combination of 80% steel and 20% plastic is available in putty or viscous liquid form.

The manufacturer reports it is being used by aircraft companies for making, forming or stamping dies for metal, filling large or small holes in castings, bonding steel to itself or to aluminum, bronze, brass, iron and porcelain, rebuilding broken machinery, and building up the inside of pumps and valves.

Chemical Development Corp., Danvers, Mass.

ALSO ON THE MARKET

Roll-over vacuum lifter lifts non-porous sheets up to 5 ft. wide by 20 ft. long, weighing 2,000 lb. with a 7:1 safety factor. The sheet lifter rotates the sheet 180 deg.—F. J. Littell Machine Co., 4203 B Ravenswood Ave., Chicago 13, Ill.

Cam-operated precision boring machine, Style 312, features fast changing cams for producing variety of forms.—Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

16S quill adjustable cutterhead permits horizontal, angular and vertical milling, plus boring and drilling on one machine without attachments.—Van Norman Co., 3600 Main St., Springfield, Mass.

Airflex cold-flow dimpling is reported to be particularly interesting to aircraft manufacturers because of application on titanium alloys.—Lenert Engineering Co., Inc., 201 E. Jefferson St., Plymouth, Ind.

Executive secretary desk chair Model 633 for multi-engine airline and corporate aircraft has 360-deg. swivel mechanism providing position lock on 15 deg. increments of rotation.—Hardman Tool & Engineering Co., 1845 S. Bundy Dr., Los Angeles 25, Calif.

Optical engineering experimental kit contains wide selection of precision optical components. Priced at $49.50, kit includes prism, cylindrical and spherical lenses and flat, cylindrical and spherical mirrors suitable for use in all types of optical systems and devices.—Houston Technical Labs., P. O. Box 6027, 2424 Bramard, Houston 6, Texas.

MicroBrazer soldering tool meets requirements for soldering components of guided missiles—silver solder brazing on small parts to 1,250 deg. Timer is adjustable through a range of 1/60 to 3 sec. Unit also is supplied with foot switch and choice of several models of standard and heavy-duty probes.—Zephyr Mfg. Co., Inc., Inglewood, Calif.

Small portable bench center for grinding index detents has integral surface plate. Mandrel holding work piece and template are set between centers, accurate in all directions to 0.0005 in.—Transvicoil Corp., Worcester, Montgomery County, Pa.

Magnesium mounting bases are reportedly 25% lighter than their aluminum counterparts. Galvanic action between magnesium and stainless hard-

ware is avoided by padding nylon between the materials—T. R. Finn Co., Inc., Electronics Division, 200 Central Ave., Hawthorne, N. J.

Vinyl-lined flight case has cut out front and fold back top for inflight accessibility.—Jeppesen & Co., Aviation Sales Division, Denver, Colo.

Synthetic rubber compound No. 47-671 used in aircraft hydraulic service O-rings permits operation in the temperature range of −65 to +275°F.—T. J. McCuistion, Rubber Products Division, Parker Appliance Co., 17325 Euclid Ave., Cleveland, Ohio.

Insulated plastic oxygen hose carries radio wire outside the tube, lessening danger of sparks from the wire igniting oxygen.—Dayton Rubber Co., Dayton.

Power reversible, trip-blade snow plow can be angled up to 37 deg. Automatic reversing mechanism can be used in any position and pre-loaded trip spring with linkage to moldboard provides smooth action when obstruction is encountered.—Frink Snow Plows, Inc., Clayton, 1000 Islands, N. Y.

Hydraulic clamp with rotator and side shifter eliminates need for several attachments for handling various size boxes on fork lift truck, maker reports. Distance between bottom forks and top plate can be hydraulically adjusted from 26 to 76 in.—Yale & Towne Manufacturing Co., 11,000 Roosevelt Blvd., Philadelphia, Pa.

Niagara No. 150 band operated deep throat combination machine has 12 pair of standard tolls for turning, burring, wiring, elbow edging, beading, crimping, furnace collar edging, body flanging, slitting and trimming.—Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N. Y.

GS12D Dekatron cold cathode counting tube has a plug-in base for new applications of glow counting. Envelope design provides a shorter tube with a smooth end face for improved readability.—Atomic Instrument Co., 84 Massachusetts Ave., Cambridge 39, Mass.

Nordex power cutter has a detachable crank case for at least six different operations. Quick tool changes make cutting, beading, folding and doming more accessible. Unit has ¾-hp. motor.—Nordex Corp., Nutley, N. J.

Rectangular shaped vapor spray degreaser for large size parts has fused phenolic interior coating to protect against corrosion. Machine has automatic solvent reclaimer for non-inflammable trichlorethylene vapors used in parts cleaning.—Baron Industries, 241 West Ave., Los Angeles 31, Calif.

Zip-lift wire-rope electric hoist has motor brake and load brake, both of which hold full loads. A 10-ft. lift is standard with longer lifts optional.—P&H Hoist Division, Harnischfeger Corp., Milwaukee 46, Wis.

NLS Model 451 self-balancing digital potentiometer provides automatic digital display of d.c. voltages. Reference voltage for measurement is supplied by a series of mercury cells assembled into a compact battery pack having an operating life exceeding 10,000 hours.—Non-Linear Systems, Inc., Del Mar Airport, Del Mar, Calif.

New hammer has interchangeable heads of aluminum, brass, copper, two types of nylon and three hardnesses of plastic. Spring pin mechanism safely locks head into place.—Hi-Lok Mfg. Co., 1625 Massilon Rd., Akron, Ohio.

Manco hydraulic utility press provides 35-ton thrust for punching, shearing, angle iron notching or forming light-gage metals. Machine operates on a 1½-in. stroke with a 1½-sec. operational cycle.—Manco Mfg. Co., Bradley, Ill.

Piedmont Strengthens Route Structure

Local service carrier enters Washington market; Fokker F-27 turboprop seen as DC-3 replacement.

By Craig Lewis

Winston-Salem, N. C.—Piedmont Airlines entry into the lucrative Washington, D. C., market has strengthened the local service carrier's route structure and underlined the pressing need for the replacement of its DC-3 fleet.

Piedmont has three flights daily now between Washington and Knoxville, Tenn., and the airline estimates the new service will produce an additional 1,800 passengers a month at the beginning and considerably more when it becomes established.

The new route gives Piedmont, one of the biggest local service airlines, access to a large metropolitan market, something it lacks in the mountainous areas of Virginia, Kentucky, North Carolina, West Virginia and Tennessee.

Seek Chicago Entry

The next route improvement Piedmont seeks is entry to Chicago from terminals at Columbus and Cincinnati, Ohio, and Louisville, Ky. The carrier would also like to link stub-end terminals Louisville and Knoxville.

Piedmont figures that about 60% of its passengers going into Columbus, Cincinnati and Louisville are headed for Chicago or points west of there. The carrier wants to carry them on to Chicago and is asking the Civil Aeronautics Board to extend its routes.

If route extensions aren't granted, Piedmont president T. H. Davis told AVIATION WEEK he thought interchange service with an airline flying between Chicago and the three Piedmont terminals is feasible and could be the answer to the need for through service.

According to Davis, Piedmont operates on the theory that a successful local service operation is based on two key factors—frequency of service and high utilization. The carrier claims the highest utilization in the local service industry—slightly over eight hours daily.

Service frequency is considered important in promoting new business. Piedmont finds that the addition of new flights on a segment tends to promote new business for existing flights and has the total effect of raising the segment load factor. The local carrier is currently operating with load factors between 58% and 60% over its entire system. Breakeven load factor is 55%.

Route Adjustments

Piedmont doesn't expect any direct benefit from the recent permanent certification granted to local airlines by Congress. The company didn't favor permanency through legislation but felt that CAB wasn't moving quickly enough to accomplish it within a reasonable time.

All but two points on Piedmont's system meet CAB traffic standards for permanent certification, but the carrier will ask CAB for temporary certification of four points which exceed the five passenger daily standard—Hickory, Pinehurst-Southern Pines, Kingston and Morehead City. While these points could be certificated permanently, Piedmont feels that its routes might need adjustment in the future and temporary authorization for four points will make it easier.

Permanent certification will probably benefit Piedmont most when the time comes to borrow money for replacement of its fleet of 16 DC-3s. Davis told AVIATION WEEK that, while substantial progress is being made, local airlines probably won't get off subsidy until they find a new airplane to replace the aging DC-3. When a suitable airplane is available, the cost of fleet replacement will be high—probably close to $500,000 an airplane.

Davis discounted Martin or Convair equipment as possible replacements for Piedmont. He feels that local airlines should move on to an advanced design when they switch equipment rather than go to equipment which is already becoming obsolete.

DC-3 Replacement

Davis feels that the Fokker F-27 and the Handley Page Herald come closest to meeting the specifications. The Fokker is a twin engine, high wing turboprop transport. The Herald has four piston engines.

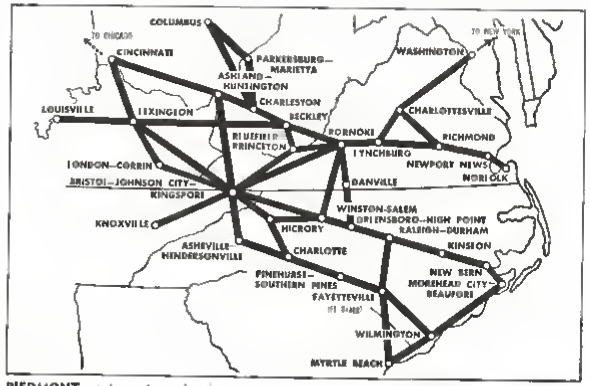
If the F-27 measures up to performance predictions when it flies this fall, Davis feels it offers the best prospect for replacement of the DC-3. A tentative price of about $450,000 has been estimated for the F-27. The Herald prob-

Piedmont Gains

Piedmont Airlines flew 167,663 passengers 32,471,491 passenger miles in the first six months of 1955 with an average load factor of 50%.

Traffic for the same period of 1954 was 142,951 passengers and 28,677,299 passenger-miles. Load factor was 44%.

Piedmont's total income for the first half of the year was $3,361,322. Net income after provision for taxes was $12,194.



PIEDMONT route system showing new extensions between Knoxville and Washington.

ably will sell for about $375,000

Davis prefers the two engine airplane because it fits in with Piedmont's philosophy on flight frequency He says it is smarter for a local airline to run a small airplane on many frequencies than a large airplane on fewer flights

The Piedmont official also thinks that the F-27 has great passenger appeal because its high wing configuration gives better visibility as well as making loading and unloading easier

Pressurization, available on the F-27, not only attracts the passenger, but it contributes to operational efficiency by allowing shirtsleeve ascent and descent

Davis also points to higher speeds, better ground time, lower seat-mile costs and easier maintenance as further advantages over the DC-3 The F-27 will be able to operate out of DC-3 airports where Martins and Convairs would operate with a weight penalty

He believes there will be a wide executive and military market for the F-27 which will help reduce the price

New North-South Cargo Network Recommended by CAB Examiner

Washington, D C—An extensive new network of all-cargo routes between the Northeast and Midwest and points in the South has been recommended by Civil Aeronautics Board Examiner James S Keith in his report on the Air Freight Renewal Case

Riddle Airlines and American Air Export and Import Co are favored in the report for certification on the north-south routes They would get a five-year authorization to develop the air freight potential of the routes

The examiner finds that the certificate of U S Airlines, an early all-cargo carrier, should not be renewed

Keith recommends for Riddle Airlines a route structure between Miami and northern points One route would run between Boston and Miami via New York Philadelphia, Baltimore, Washington, Richmond Jacksonville Tampa and Sarasota Another Jacksonville Miami segment would operate via Palatka, Orlando, Fort Pierce and Stuart

From the Midwest Riddle would be authorized to fly between Chicago and Miami via Indianapolis, Louisville, Atlanta, Jacksonville Tampa and Sarasota with a second Jacksonville segment via Palatka, Orlando Fort Pierce and Stuart Beyond Atlanta Riddle also could serve Cincinnati, Columbus, Cleveland and Detroit from Miami

American Air Export and Import Co would get routes between New Orleans and the north under Keith's recommendations Between New Orleans and New York, AAXICO could serve Birmingham Atlanta Richmond, Washington, Baltimore and Philadelphia

The carrier would get two routes to the Midwest from New Orleans One would be to Chicago via Birmingham and Indianapolis and the other to Detroit via Birmingham Louisville, Cincinnati, Columbus and Cleveland

The examiner's report is on the north-south phase of the Air Freight Renewal Case When CAB certificated the all-cargo carriers, it set a five year limit on the experiment which expired last summer A consolidated renewal proceeding was instituted to review the air freight situation Thus proceeding became delayed last winter, largely due to the failure of the Slick Airways-Flying Tiger Line merger and Riddle asked CAB to sever the north-south phase for separate consideration

CAB severed the north-south phase and Examiner Keith has reported on that portion of the case He has recommended that policy questions involving carriage of mail and air express on cargo lines be deferred for decision on the east-west portion of the case

Favorable CAB action on Keith's report would offer extensive north-south all-cargo services east of the Mississippi service now offered on a limited scale by Delta Air Lines and Riddle Riddle now operates between New York, Miami and Puerto Rico AAXICO operates a cargo service between the U S and Central and South America and does contract work for the Defense Department

In his report, Keith says AAXICO's lack of experience and familiarity with the requirements of a New York-Florida and Midwest-Florida service and Riddle's recognition of its inability to institute service between New Orleans and New York and New Orleans and the Midwest for a considerable period after certification plus the fact that U S Airlines is currently insolvent and has been declared bankrupt emphasizes the need for dividing the routes between two carriers so that operations over all routes can be inaugurated immediately and the Board can have the benefits of a complete five-year experimental record

In view of the unproven airfreight potential at certain points, the report recommends that a number of them be included in the certificates on a demand basis Tariffs filed for such points would set a standard of freight volume required before a stop would be made

On Riddle's certificate this rule would apply to Baltimore, Washington Richmond Jacksonville Palatka Orlando Fort Pierce, Stuart, Louisville, Indianapolis Cincinnati and Columbus AAXICO would have Philadelphia, Baltimore Washington, Richmond, Louisville Indianapolis, Cincinnati and Columbus as demand points

Transport Sales' Report Card

U.S. aircraft builders have sold 1 525 commercial transports since the end of World War II Of the total 1 149 had been delivered by last week The breakdown of orders and deliveries, as compiled by Aviation Week

COMPANY	MODEL	ORDERED	DELIVERED
Boeing Airplane Co	377	56	56
	707		
Convair, division of General Dynamics Corp	240	177	177
	340	208	203
Douglas Aircraft Co	DC-6	174	174
	DC-6A	44	27
	DC-6B	257	184
	DC-7 7B	151	76
	DC 7C	94	
	DC-8		
Lockheed Aircraft Corp	1049C D & E	78	78
	1049G	64	30
	1049H	9	
	1649	34	
	Electra	35	
Glenn L Martin Co.	2 0-2	31	31
	2-0 2A	12	12
	4 0-4	101	101
TOTAL		1,525	1,149

Mass Volume Helicopter Needed To Make Short-Haul Profitable

By Gordon Conley

Ithaca, N Y—Mohawk Airlines wants to resume helicopter service with a multi-engine transport similar to Sikorsky Aircraft's S-56 but with a cabin modified to meet fixed-wing standards and able to carry 35 to 40 passengers With such a rotary-wing airliner, the local service carrier expects to make its first deep penetration of the short-haul travel market

"This is the transport that can give us mass volume," Mohawk President Robert E Peach says "So far, the airlines' share of short-haul traffic is slightly more than 2%."

Mohawk has been planning eventual conversion to an all-helicopter fleet since its experiment last year with an eight-passenger Sikorsky S-55 (AW Aug 15, p 123) In addition to a large rotary-wing transport, the carrier believes these problems must be solved before it can switch from a fixed-wing operation

• **Heliports** The local service airline wants assurance that it will be able to operate out of business districts in cities on its routes—particularly in the New York metropolitan area "We're waiting as much for a New York heliport as we are for a helicopter," Peach says

• **Public acceptance** "Communities must be ready for helicopters and realize that the noise of eggbeaters overhead is just as much a part of the normal scene as trucks and trains."

Cost, Operational Studies

Helicopter studies made by Mohawk call for a transport with at least two, but preferably four, engines It must carry from 30 to 40 passengers, a three-man crew plus baggage, cargo and mail Minimum cruise speed would be 140 mph and fuel range 200 miles The carrier lists no preference on rotor configuration, but Research Director David E Postle points out that there would be a 15% weight penalty with twin rotors

Of the U S rotary-wing transports now in production, Mohawk is interested only in Sikorsky's S-56 This twin-engine single-rotor copter is being built for the military however, and it will be at least three more years before a commercial version is offered

"The S-55 is the most advanced copter now in being" says Postle "But we'd have to make one or two modifications before we could get the proper fuselage We need cabins similar to those of fixed-wing transports—close to the ground for quick loading and unloading, four-abreast seats and a straight, not sloping floor"

Mohawk set the capacity minimum at 30 passengers because operating cost and revenue studies showed the expense of flying a smaller helicopter would push fares too high to attract traffic

"We've got to reduce the average passenger fare on the normal 179-mile short-haul flight from $12 to $8" says Postle, a member of the Air Transport Assn 's Committee on Rotorcraft and the International Air Transport Assn 's Helicopter Committee "We can do this if we have a helicopter with a direct operating cost per available seat-mile of about 4 cents

"While some operators have planned on the 16- to 20-place helicopter for operation in metropolitan areas I believe the related seat-mile costs and the required passenger tariffs would preclude sufficient penetration of the short-haul passenger market In fact, it is difficult to forecast profitable operations, without mail pay or some subsidy in any type of scheduled passenger service providing less than 30 seats

Postle disputes a statement by Robert L Cummings, president of New York Airways, that short-haul airlines should operate 20-passenger transports on frequent flight schedules in a bus-type service (AW May 23, p 107) A larger copter, Cummings said, would be hard to fill

Mohawk's experience clearly shows that this assumption is not correct, Postle says, "for successful short-haul passenger service is the result of a delicate balance between properly-timed schedules at the hours people desire to travel, adequate capacity of the aircraft at peak travel hours and load factors on each schedule operated."

Postle believes the total operating cost of the helicopter called for in Mohawk's studies can be reduced to below that of fixed-wing transports on short-haul routes

"Direct operating costs per available seat-mile on any fixed-wing aircraft is about 2 cents," he says It goes up sharply on any block distances of 75 miles or less If the helicopter's operating cost can be brought down to 4 cents, it will remain constant on stage lengths down to about 70 miles."

Passenger Confidence

Mohawk President Peach is convinced the helicopter will give local service airlines a transport able to compete for the first time with railroads, buses and private automobile He lists these advantages

• **Passenger confidence.** "The biggest attraction of helicopters from the passenger's point of view is elimination of taxiing and takeoff and landing runs When a copter lands the passenger has the same sensation as braking an auto And this comforts him"

• **Smooth air characteristics.** There's no such thing as turbulence in a helicopter It doesn't have a wing forcing its way through the air and taking thermals The rotors are flexible

• **Weather maneuverability** A rotary-wing transport usually will be able to go under the weather cutting down on the number of instrument (IFR) approaches a passenger must sit out

(This is the last in a three-part series on Mohawk Airlines)

New York Heliport Plan Denied

The Port of New York Authority lost its bid last week to build a $50,000 temporary heliport on Manhattan's Hudson River waterfront and follow this within three to five years by a $5-million permanent facility

Vincent A G O'Connor, New York Commissioner of Marine and Aviation, turned down PNYA's recommendations on grounds that the proposed location of the 100-by-400-foot strip between the Hudson and an elevated highway constituted an "extreme hazard"

As predicted by AVIATION WEEK (July 18, p 7), O'Connor cited the crash of a Bell 47G last month from the top of the Port Authority's 16-story midtown building 'We believe that tragic event should have alerted you to the public danger inherent in the bulkhead (temporary strip) proposal," he said in a letter to Authority officials

Replied PNYA Executive Director Austin J Tobin "Nonsense"

O'Connor earlier had countered the Port Authority's proposal with a plan to build a waterfront freight terminal in the same general location as the temporary strip and add a rooftop heliport to the facility He said last week he still favors this construction

Arguments offered by PNYA Aviation Director Fred M Glass against O'Connor's plan included studies that indicated the ground-level strip would be safer than a rooftop heliport He added that the commissioner's proposal also would be only a temporary facility but would cost $550,000 more than the Port Authority's heliport; would take more than a year to build, compared with 30 days for the strip, and would

not have the operational advantages of the simpler construction.

Glass received strong support from New York Airways, the metropolitan area's scheduled helicopter airline. NYA President Robert L. Cummings said studies by his company favored the strip proposal because it offers:

- **Greater area** for takeoffs and landings and more operational reliability.
- **Full utilization** without involving theoretical performance data and untried flight techniques.
- **Operational flexibility** that will cope with the performance characteristics of future transport helicopters as well as the Sikorsky S-55—the only rotary-wing aircraft considered in O'Connor's roof-top-heliport plans.
- **Complete evaluation** of wind and weather data before a permanent facility is constructed.

HELIPORT PROPOSALS for Manhattan include permanent facility (right) and rooftop plan.

CAB ORDERS

(Aug. 11-17)

GRANTED

Flying Tiger Line an exemption to perform one roundtrip flight between Miami and Paris pursuant to a contract with the Michael Roshkind Co. on behalf of Colonial Pontiac of Miami.

Continental Air Transport Co. permission to intervene in the Helicopter Air Service and Midway Airlines certificate case.

Capital Airways an exemption to perform one flight from Washington, D. C. to London, Ontario and return to Jackson, Mich., pursuant to a contract with Ray Anthony's Orchestra.

Pan American World Airways an exemption to perform one roundtrip flight between Honolulu and Tafuna, American Samoa, via Canton island with DC-4 equipment in addition to its scheduled service.

Peninsula Airport Commission permission to intervene in the New York-Florida Route Case.

North Central Airlines an exemption to overfly Green Bay, Wisc., on flights scheduled between Wausau, Wisc., and Chicago, Ill., via Milwaukee and Oshkosh, Wisc., for one year.

APPROVED

Agreements between Continental Air Lines, Branniff Airways and various other carriers relating to inter-carrier arrangements.

Resolutions between various carriers adopted by the International Air Transport Assn. relating to proportional cargo rates between Mexico City and Houston.

DISMISSED

Caribbean International Airways' application for a foreign air carrier permit since the applicant has ceased operations.

Transocean Air Lines' application for an exemption to perform a flight from New York to Rome at the request of the applicant.

National Airlines' complaint against Eastern Air Lines' proposal to use combination coach/first class equipment in its domestic coach service.

Air Transport Associates' application for a certificate or exemption authority to serve certain routes since the applicant failed to respond to a CAB query.

DENIED

City of Freeport, Ill., permission to intervene in the Helicopter Air Service and Midway Airlines certificate case.

SHORTLINES

► **Air France** carried more than 797,000 passengers in the first six months of 1955, an increase of 22% over the same period of 1954.

► **Air Transport Assn.** reports an increase of 20% in scheduled interline business transacted in July 1955 through the Airline Clearing House over July 1954. Amount was $48.9 million in July 1955, as compared with $40.9 million in July 1954.

► **British Overseas Airways Corp.** flew 50,623,000 passenger miles in the two-week period ending July 9. The passenger total was up 21% over the previous record period in September 1953.

► **Flying Tiger Line** reported the largest air freight business in its history during June. Revenue for the month was $641,000, as compared with $89,000 for the same period last year. Contract division compiled revenues of $1,431,000 in June, nearly seven times the contract volume for June, 1954.

► **KLM Royal Dutch Airlines** carried 25,831,000 ton-kilometers of cargo during the first six months of 1955, 17% over same period in 1954.

► **Panagra** will grant 18 travel fellowships for study in U. S. universities to graduate students from countries on its route in Latin America. The students were selected by the Institute of International Education.

► **Pan American World Airways** carried 532,508 lb. of cargo between the U. S. and Europe in July, a new cargo record and a 55% increase over July, 1954. PanAm operates eight cargo flights weekly across the Atlantic in both directions. Current plans are to increase the flights to 12 weekly early next month.

► **Turkish State Airlines** has started operating seven recently-purchased de Havilland Herons.

► **United Air Lines** will start a $6 million expansion program at its San Francisco maintenance base early next year. The expansion program, scheduled for completion early in 1958, will bring United's investment to $16 million.

AAL's June Traffic

June traffic figures for American Airlines (AW Aug. 22, p. 103) were based on partial data. Complete figures are: Revenue passengers, 679,407; Revenue passenger miles, 408,661,000; Revenue passenger load factor, 73.16%; U. S. mail ton-miles, 1,469,458; express ton-miles, 839,913; freight ton-miles, 5,780,976; total revenue ton-miles, 46,979,670; percentage of revenue to available ton-miles, 63.29%.

Airline Traffic—Second Quarter 1955

	Revenue Passengers	Revenue Passenger-Miles (000)	Revenue Passenger Load Factor	U. S. Mail Ton-Miles	Express Ton-Miles	Freight Ton-Miles	Total Revenue Ton-Miles	Per Cent Revenue to Available Ton-Miles
DOMESTIC TRUNK								
American Airlines	1,947,232	1,133,471	69 63	4,510,855	2,474,383	16,642,268	132,756,754	61 10
Braniff Airways	426,403	158 398	63 62	461 585	299,802	954 118	16,867,871	57 03
Capital Airlines	686,119	215,095	61 00	860,453	615,042	949,948	22,975,845	45 31
Colonial Airlines	125,474	38,313	60 29	42 882	18,879	93,734	3 892 999	57 57
Continental Airlines	*	59 425	55 72	189 959	76,014	361,178	6,314,080	47 64
Delta-C & S Air Lines	552,550	231,318	68 98	799,159	619,211	1,678,504	27,199 249	62 83
Eastern Air Lines	1,702,392	845,589	64 91	2,510,891	1,302,505	3,340,787	93,567 994	53 60
National Airlines	302 889	211,746	67 97	714,409	148,659	1,032,079	23,424,795	66 65
Northeast Airlines	138 774	28,008	58 22	32,704	41,053	105 510	2 730,093	56 68
Northwest Airlines	337 290	219,294	58 33	1,132 306	628,543	1 568 202	24,940,991	52 55
Trans World Airlines	998,112	741 319	68 03	3,213,360	1,830,420	5,845,418	81 871 642	62 13
United Air Lines	1 459,647	1,040 431	69 61	6 429,793	2 883 389	10,628,889	120 153 968	60 37
Western Air Lines	275,693	127,813	59 54	696,614	201,615	659,144	13,696 156	55 21
LOCAL SERVICE								
Allegheny Airlines	94 053	15,002	49 58	19 442	42,818		1,493,251	49 49
Bonanza Air Lines	25,858	5,628	43 40	9,891	5,444	15,041	568,062	42 00
Central Airlines	24 954	3,964	28 41	12,233	4,408	14,198	409,931	25 71
Frontier Airlines	44,488	11 684	45 70	43,834	21 141	178,944	1,360,274	55 86
Lake Central Airlines	29,236	4,369	36 10	7,335	28,187		433,599	33 27
Mohawk Airlines	68,819	12,297	61 65	12,839	18 914	20 306	1,223,141	61 32
North Central Airlines	110,496	17,447	57 63	49,081	64,605		1,773,120	46 00
Ozark Air Lines	67 273	10,126	39 54	20,021	35 762		1,001,977	39 68
Piedmont Aviation	100,267	19,236	55 08	27,982	27,539	37,501	1,934 266	54 36
Southern Airways	45 903	7,779	44 68	25,213	31,562		800,782	42 45
Southwest Airways	70,688	13,406	56 40	19 608	13,574	38,574	1,349 044	57 32
Trans Texas Airways	40,702	9,241	39 68	33 868	17,396	41,175	972 568	36 71
West Coast Airlines	53,955	9 059	44 80	11,450	5 868	22,633	863 243	48 35
INTERNATIONAL								
Braniff Airways	8,995	19,842	46 29	93 105		262,691	2,594,136	47 48
Delta-C & S Air Lines	12,374	14 011	47 18	20 936		178 876	1,640,934	39 98
Eastern Air Lines	46 410	64,828	66 40	166,382		234,978	7 310,833	60 35
Northwest Airlines	25,205	49 930	53 83	2,491,128	46,899	1,792 300	9,650 555	64 08
Pan American World Airways								
Alaska	20,672	24,946	59 29	98,799		1,164,117	3,785,552	49 80
Atlantic	228,265	287 570	68 27	2,521 036		4 651,169	37,179,556	66 96
Latin America	239,900	230,845	63 50	972,642		7,455,893	30,844,595	60 51
Pacific	57,377	179,128	70 68	3 695 483		3 190,329	25,606,022	68 37
Pan American-Grace Airways	33,789	39,346	59 17	180 685		635,346	5,057,438	56 22
Trans World Airlines	69,052	179,539	71 05	2,103,372		2,008,748	23,057,424	72 09
HAWAIIAN CARRIERS								
Hawaiian Airlines	99,927	13,403	62 87	11,861		385,145	1,563,585	55 42
Trans-Pacific Airlines	50,159	6,381	55 15	2,994	252	26,789	527,080	54 31
CARGO LINES								
Flying Tiger Line	*							
Riddle Airlines						3,132,876	3,132,876	83 58
Slick Airways	128	168	26 79			4,022,694	4,085,370	70 96
HELICOPTER SERVICE								
N. Y. Airways	6,524	132	51 30	4,054	3,171	1,375	20,875	53 74
Los Angeles Airways	1,267	29	16 02	14,688	5,209		22,324	40 65
Helicopter Air Service (Chicago)	None			7,361			7,361	42 70

* Not Available
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(For First Quarter Figures See Aviation Week June 20, p. 98)

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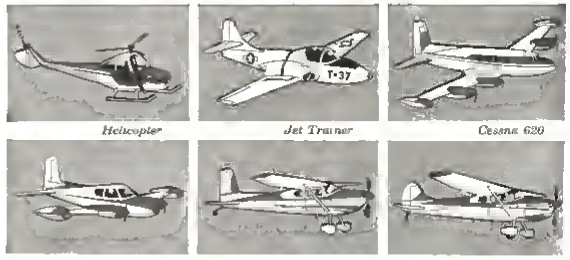

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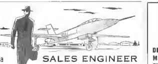

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AVIATION WEEK—AUGUST 29, 1955

EDITORIAL

Danger Signals in the Orient

There are many danger signals visible in the Orient today that indicate the Sino-Russian alliance plans further aggression on our Far Eastern frontier. These danger signals are clear and unmistakable despite the fact that daily newspapers' headlines from the Orient are now featuring a "cease-fire" and "peace" talks and the release of USAF prisoners illegally held by the Chinese for more than two years.

AVIATION WEEK's military editor Claude Witze reported recently from Korea (AW Aug. 1, p. 12) on the Communist increase of air strength in North Korea less than ten minutes flying time away from the United Nations bases in South Korea and within easy striking distance of Japan. All of this air activity, including reinforcement of the Communist air force with 300 MiG-15s, building of 35 airfields, construction of underground hangars and fuel storage dumps, is in direct violation of the Korean truce agreement. Any one who may be heartened by the Communists new look of sincerity and geniality at Geneva should look at how they have brazenly violated the Korean truce terms.

Reds Learned Lesson

The Communists know full well, even if the American people don't, that U.S. airpower—USAF, Navy and Marines—was all that prevented a complete Communist victory on the Korean Peninsula. They made a great mistake in underestimating the effectiveness of U.S. airpower, and they don't intend to make the same mistake twice.

Another story of Communist air strength increases comes in private communications from two top American air commanders in the Far East. Although they represent two different services, their views of the enemy opposing them are strikingly similar, and they deserve wide dissemination among the American people.

They report that Communist air strength in the Far East stretching from the maritime provinces of Siberia to the South China sea coast now totals more than 7,000 planes including MiG-17 fighters and Il-28 twin jet bombers. They estimate the Russian air strength along the Siberian coast to be far in excess of what would be required for purely defensive operations. These Siberian bases bring both the Il-28 bombing force and the MiG-17 fighters equipped with auxiliary fuel tanks (of which AVIATION WEEK published photos, Mar. 14, p. 96) within easy range of virtually all USAF and Navy bases in Japan.

On the southern end of the Communist line, they report an unremitting effort to build air bases, logistical support lines and auxiliary facilities in the provinces of Fukien, Kwangtung and Kiangsi opposite the Formosa Straits. This effort is continuing at the same steady pace during the "cease-fire" talk as it did when American newspaper headlines shouted blackly of the imminent invasion of Formosa and the off-shore islands.

Americans who operated with General Claire Lee Chennault in these same provinces during World War II are familiar with the difficulties of logistical support for a sustained air offensive from this area. Many of the fields now being enlarged by the Communists to take jet aircraft were originally built by the Chinese Nationalists and used by the P-40s and B-25s of the 14th Air Force to smash at Japanese air training centers on Formosa and destroy shipping in the Formosa Straits. These Americans who used Kanchow, Changting, Suchwan and other East China fields now being modernized by the Communists are also aware of the advantages of tactical surprise they afford and how difficult it can be for counter air operations to destroy a force effectively shuttled between these staging fields and main bases inland beyond the range of either Formosa or carrier-based bombers.

These three reports paint a consistent picture of Communist air acceleration all along the Far East frontier from Siberia to the South China Sea.

The Communist professions of peace at Geneva and elsewhere should be evaluated against the facts of their steady increase in air strength all along the Far East frontier and the tremendous research, development and production effort the Russians are now operating to build offensive airpower for themselves and their Communist satellite nations.

Now Not a Time To Relax

Words can be changed swiftly from peace to war, and history is full of treaties that were torn up in a trice. But it takes many years of steady and skillful effort to build effective airpower. If we relax our effort to produce superior airpower and accept a ban on atomic weapons as a result of the current vogue of Communist lullabies we will have suffered a major defeat and handed our enemies a significant victory.

We now enjoy a margin of atomic airpower superiority over the Communists and that is all that has kept Western Europe and many other parts of the world out of the Communists' clutches. The size and significance of our airpower superiority margin has diminished in recent years as the Russians have accelerated their air effort and we have voluntarily reduced our own pace.

Unless we accelerate the pace and scope of our airpower program to regain a clear and significant lead over the Russians we are doomed to a position of inferiority around the diplomatic conference table.

—Robert Hotz

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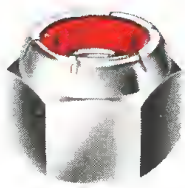
Elastic Stop® nuts



Each hammer-stroke of this 270-foot pile driver delivers a 24-foot-ton wallop! It was built by Raymond Concrete Pile Company to drive 200-foot pipe piles for the foundation of units being added to the B. C. Cobb Steam Plant of Consumers Power Company, at Muskegon, Mich.

Raymond makes a practice of using Elastic Stop® nuts for bolting together sections of leads and booms on all their pile-driving equipment. The red elastic locking collar of these vibration-proof fasteners has successfully maintained its grip under these severest of all vibration and impact conditions!

Whether used on aircraft or locomotives; guided missiles or steam shovels . . . more than twenty years of field testing on applications where safety and severe operating conditions demand a fastener that will not shake loose, prove that . . . *you can rely on Elastic Stop nuts.*

ELASTIC STOP NUT CORPORATION OF AMERICA

Department N77-825 • 2330 Vauxhall Road • Union, N. J.

The red locking insert in an Elastic Stop nut guarantees

- reusability
- vibration-praaf lacking
- thread sealing . . . no galling
- immediate identificatian
- adaptability ta all shapes and sizes af threaded fittings
- suitability to praductian line assembly methads